PB80-900115

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GOVERNMENT REPORTS

Announcements & Index

15 July 18, 1980
U.S. Department of Commerce
National Technical Information Service
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U.S. DEPARTMENT OF COMMERCE Philip M. Klutznick, Secretary of Commerce
NATIONAL TECHNICAL INFORMATION SERVICE Melvin S. Day, Director

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GOVERNMENT REPORTS

Announcements & Index

Volume 80, Number 15 July 18, 1980

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* Committee on Scientific and Technical Information

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MAIN ENTRY

Report entries are arranged by subject group and field. Within fields they are arranged alphanumerically by NTIS order number (accession number); alphabetic data precedes numeric.

Field 10 ENERGY CONVERSION (NON-PROPULSIVE)

Group 10A Conversion Techniques

Order number — **PB-254 315/5GA** PC **A16**/MF **A01** — **Price codes**

Corporate author — Smithsonian Science Information Exchange, Inc., Washington, D.C.

Personal author — **Information on International Research and Development Activities in the Field of Energy,** David F. Hersey. May 76, 370p* NSF/RA-760057, Grant NSF-AER74-20678 — **Report title**

This directory is the product of a data collection effort undertaken by the Smithsonian Science Information Exchange (SSIE) on behalf of an interagency committee formed under the U.S. State Department to provide international cooperation in energy research and development. Included is information covering 1766 ongoing and recently completed energy research projects conducted in Canada, Italy, the Federal Republic of Germany, France, the Netherlands, the United Kingdom, and 25 other countries. In addition to the title and text of project summaries, the directory contains the following indexes: Subject Index, Investigator Index, Performing Organization Index, and Supporting Organization Index. — **Abstract of report**

INDEX ENTRIES

Index entries are arranged alphanumerically. Titles are included in all indexes except the Contract Number index.

SUBJECT

ENERGY
Information on International Research and Development Activities in the Field of Energy.
PB-254 315/5GI 10A

Entries are sequenced by major subject term and by NTIS order number.

PERSONAL AUTHOR

HERSEY, DAVID F.
Information in International Research and Development Activities in the Field of Energy.
PB-254 315/5GI 10A

Entries are sequenced by personal author, report title, and NTIS order number.

CORPORATE AUTHOR

SMITHSONIAN SCIENCE INFORMATION EXCHANGE, INC., WASHINGTON, D.C.
Information on International Research and Development Activities in the Field of Energy.
(NSF/RA-760057)
PB-254 315/5GI 10A

Entries are sequenced by corporate author name, original report number, and NTIS order number. The monitor agency number is given following the report title.

CONTRACT GRANT NUMBER

NSF-AER74-20678
Smithsonian Science Information Exchange, Inc., Washington, D.C.
PB-254 315/5GI 10A

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ACCESSION/REPORT NUMBER

PB-254 315/5GI
Information on International Research and Development Activities in the Field of Energy.
PB-254 315/5GI 10A PC **A16**/MF **A01**

Entries are sequenced by NTIS order, original report, or monitor agency number. Price codes are given in this index.

1. AERONAUTICS

1A. Aerodynamics

AD-A082 438/3 PC **A04**/MF **A01**
Physical Sciences Inc Woburn MA
Rough Wall Reentry Heating Analysis. Effect of Surface Roughness Character on Turbulent Boundary Layer Heating.
Final rept. 1 Dec 77-30 Sep 79,
M. L. Finson, A. S. Clarke, and P. K. S. Wu. Feb 80, 56p PSI-TR-204, AFOSR-TR-80-0251
Contract F49620-78-C-0028

A Reynolds stress model is used to evaluate the effect of surface roughness on turbulent boundary layers. Roughness is represented by distributed source or sink terms in the various governing equations, the most important term being a sink term in the mean momentum equation describing form drag on the roughness elements. The blockage effect of closely spaced elements is treated by accounting for the volume fraction occupied by the solid material. Calculations based on the theory have been compared with the available data on the influence of roughness character, where the roughness shape and spacing were varied. Reasonable agreement was obtained against most of Schlichting's low speed data with spherical, spherical segment, and conical roughness elements at various spacings. The cone measurements imply a somewhat higher effective drag coefficient than observed on the other shapes. The second set of experiments that were analyzed in detail were performed by Acurex under supersonic conditions, with a number of roughnesses created by grit or chemical etching processes. The heat transfer data and the present theory indicate spacing to be more important than height under the conditions tested.

AD-A082 534/9 PC **A08**/MF **A01**
State Univ of New York At Buffalo Fluid and Thermal Sciences Lab
Stability and Transition of Wall Boundary Layers Induced by Moving Waves.
Final rept. 15 May 74-14 May 79,
J. Gordon Hall, and Yehia Mamoud Amr. 15 Jul 79, 158p AFOSR-TR-80-0231
Grant AFOSR-74-2719

The present study concerns a theoretical investigation of stability and an experimental investigation of transition for wall boundary layers developed within unsteady plane expansion waves and behind shock waves traveling into a gas at rest. The theoretical investigation involved three tasks: the use of approximate methods for the prediction of critical Reynolds numbers, a numerical integration of the ORR-Sommerfeld equation for the incompressible boundary layer flow at the expansion wave head, and the development of a multiple scales technique for nearly quasi-steady, quasi-parallel boundary layer flows. The boundary layer flow at expansion wave head has the same velocity profile as a semi-infinite flat plate given a sudden constant acceleration after being at rest. Expansion wave boundary layer transition times observed after the time of wave head arrival, are five to eight times larger than those previously reported and most of the transition Reynolds numbers observed are above or near the critical Reynolds numbers calculated by the approximate method. Shock wave boundary layer transition times observed are also larger than those previously reported and some of the transition Reynolds numbers observed based on distance to the shock wave front are above the critical values previously calculated.

AD-A082 744/4 PC **A04**/MF **A01**
Aeronautical Research Associates of Princeton Inc NJ
Viscous Thin Airfoil Theory.
Final rept. 1977-1980,
John E. Yates. Feb 80, 65p Rept no. ARAP-413
Contracts N00014-77-C-0616, NAS1-15936

The theory of oscillating thin airfoils in incompressible viscous flow is formulated and applied to the calculation of steady and unsteady loads on the family of symmetric Joukowski airfoils. The theory is reduced to the form of an integral equation with kernel function whose solution is obtained with a modal expansion technique familiar from flat plate thin airfoil theory. The effect of viscosity is to change the order of the singularity in the kernel function such that a unique solution is obtained for any cross sectional geometry without using an auxiliary uniqueness criteria like the Kutta condition or principle of minimum singularity. Viscous thin airfoil calculations for an airfoil with sharp trailing edge are in agreement with the results of potential theory with Kutta condition. Viscous thin airfoil steady and unsteady calculations for an airfoil with elliptic cross section are in much better agreement with experimental results. It is concluded that viscous thin airfoil theory is a practical tool for introducing simultaneously the effects of viscosity and geometric thickness in two-dimensional unsteady aerodynamic theory.

AD-A082 765/9 PC **A03**/MF **A01**
Naval Air Development Center Warminster PA Aircraft and Crew Systems Technology Directorate
On the Vertical Momentum of the Fountain Produced by Multi-Jet Vertical Impingement on a Flat Ground Plane.
Final rept.,
K. T. Yen. 1 Nov 79, 27p Rept no. NADC-79273-60

An analysis of the vertical momentum flux for the fountain produced by multi-jet vertical impingement on a flat ground plane is presented. The jets are considered to have equal thrust and the same exit diameter, and to be equally-spaced on a bolt circle. Analytical formulas for both the core and arms of the fountain have been derived, and show the dependence on the height, planform size, and number of jets. Preliminary numerical comparison with some experimental data indicates the formulas to be capable to produce acceptable predictions. Comparison has also been made with Kuhn's empirical formulas, revealing some similarity as well as differences between the two sets of formulas. Additional work needed for the development of prediction methods for lift losses is suggested. (Author)

N80-20228/6 PC **A02**/MF **A01**
National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
Transonic Unsteady Airloads on an Energy Efficient Transport Wing with Oscillating Control Surfaces.
M. C. Sandford, R. H. Ricketts, F. W. Cazier, Jr., and H. J. Cunningham. Feb 80, 9p NASA-TM-81788

An aspect ratio 10.8 supercritical wing with oscillating control surfaces is described. The wing is instrumental with 252 static orifices and 164 in situ dynamic pressure transducers for studying the effects of control surface deflection on steady and unsteady pressures at transonic speeds. Results from initial wind tunnel tests conducted in the Langley Transonic Dynamics Tunnel are discussed. Unsteady pressure results are presented for two trailing edge control surfaces oscillating separately at the design Mach numbej of 0.78. Some evperimental results are compared with analytical results obtained by using linear lifting surface theory.

N80-20229/4 PC **A02**/MF **A01**
National Aeronautics and Space Administration, Washington, DC.
On Wings of Circular Design.
W. Kinner. Oct 79, 7p NASA-TM-75505
Contract NASW-3199
Transl. Into English from Z. Angew. Math. Mech. (Germany, D.R.), V. 16, No. 6, Dec. 1936 p 349-352. Transl. By Kanner (Leo) Associates, Redwood City, Calif.

Prandtl's method of sources and sinks for air foils is used to investigate the aerodynamics of circular wings in constant flow. Lift distribution, total lift, and pitching moment are investigated as well as the influence of changes in the angle of attack.

N80-20231/0 PC **A04**/MF **A01**
National Aeronautics and Space Administration. Langley Research Center, Hampton Station, Va.
Operational Implications of Some Naca/NASA Rotary Wing Induced Velocity Studies.
H. H. Heyson. Feb 80, 53p NASA-TM-80232
Presented at 3D Midwest Helicopter Safety Seminar, Joliet, Ill., 26-27 Feb., 1980; Sponsored by FAA and Ill. Dept. Of Transportation.

Wind tunnel measurements show that the wake of a rotor, except at near-hovering speeds, is not like that of a propeller. The wake is more like that of a wing except that, because of the slow speeds, the wake velocities may be much greater. The helicopter can produce a wake hazard to following light aircraft that is disproportionately great compared to an equivalent fixed-wing aircraft. This hazard should be recognized by both pilots and airport controllers when operating in congested areas. Even simple momentum theory shows that, in autorotation and partial-power descent, the required power is a complex function of both airspeed and descent angle. The nonlinear characteristic, together with an almost total lack of usable instrumentation at low airspeeds, has led to numerous power-settling accidents. The same theory shows that there is a minimum forward speed at which a rotor can autorotate. Neglect of, or inadequate appraisal of this minimum speed has also led to numerous accidents. Ground effect and the problems it creates is discussed.

N80-20531/3 PC **A05**/MF **A01**
General Electric Co., Lynn, MA.
Calculation of Oblique-Shock-Wave Laminar-Boundary-Layer Interaction on a Flat Plate.
Final Report.
U. Goldberg, and E. Reshotko. Mar 80, 87p
NASA-CR-159829
Contract NGR-36-027-064
Prepared in Cooperation with Case Western Reserve Univ., Cleveland.

A finite difference solution to the problem of the interaction between an impinging oblique shock wave and the laminar boundary layer on a flat plate is presented. The boundary layer equations coupled with the Prandtl-Meyer relation for the external flow are used to calculate the flow field. A method for the calculation of the separated flow region is presented and discussed. Comparisons between this theory and the experimental results of other investigators show fairly good agreement. Results are presented for the case of a cooled wall with an oncoming flow at Mach number 2.0 without and with suction. The results show that a small amount of suction greatly reduces the extent of the separated region in the vicinity of the shock impingement location.

PATENT-4 188 823 Not available NTIS
National Aeronautics and Space Administration. Langley Research Center, Langley Station, VA.
Detection of the Transitional Layer Between Laminar and Turbulent Flow Areas on a Wing Surface.
Patent,
W. R. Hood. Filed 27 Nov 78, patented 19 Feb 80, 4p N80-20224/5, PAT-APPL-964 009
Supersedes PAT-APPL-964 009-78, N79-16805 (17 - 08, p 0932).
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC. 20231 $0.50.

A system is disclosed for detecting the laminar to turbulent boundary layer transition on a surface while simultaneously taking pressure measurements. The system uses an accelerometer for producing electrical signals proportional to the noise levels along the surface and a transducer for producing electrical signals proportional to pressure along the surface. The signals generated by the accelerometer and transducer are sent to a data reduction system for interpretation and storage.

1B. Aeronautics

AD-A082 512/5 PC **A06**/MF **A01**
Simula Inc Tempe AZ
Aircraft Crash Survival Design Guide. Volume II. Aircraft Crash Environment and Human Tolerance.
Final rept. Sep 77-Aug 79,
D. H. Laananen. Jan 80, 125p TR-7820, USARTL-TR-79-22B
Contract DAAJ02-77-C-0021
See also Volume 5, AD-A082 513. Supersedes rept. no. USAAMRDL-TR-71-22, AD-733 358.

This five-volume document has been assembled to assist design engineers in understanding the problems associated with the development of crashworthy U.S. Army aircraft. Contained herein are not only a collection of available information and data pertinent to aircraft crashworthiness but suggested design conditions and criteria as well. The five volumes of the Aircraft Crash Survival Design Guide cover the following topics: Volume I, Design Criteria and Checklist; Volume II, Aircraft Crash Environment and Human Tolerance; Volume III, Aircraft Structural Crashworthiness; Volume IV, Aircraft Seats, Restraints, and Litters; and Volume V, Aircraft Postcrash Survival. This volume (Volume II) contains information on the aircraft crash environment, human tolerance to impact, occupant motion during a crash, human anthropometry, and crash test dummies, all of which serves as background for the design information presented in the other volumes.

AD-A082 513/3 PC **A11/MF A01**
Simula Inc Tempe AZ
Aircraft Crash Survival Design Guide. Volume V. Aircraft Postcrash Survival.
Final rept. Sep 77-Sep 79,
N. B. Johnson, and S. H. Robertson. Jan 80, 226p TR-7823, USARTL-TR-79-22E
Contract DAAJ02-77-C-0021
See also Volume 2, AD-A082 512. Supersedes rept. no. USAAMRDL-TR-71-22, AD-733 358.

This five-volume document has been assembled to assist design engineers in understanding the problems associated with the development of crashworthy U.S. Army aircraft. Contained herein are not only a collection of available information and data pertinent to aircraft crashworthiness but suggested design conditions and criteria as well. The five volumes cover the following topics: (1) Design Criteria and Checklists; (2) Aircraft Crash Environment and Human Tolerance; (3) Aircraft Structural Crashworthiness; (4) Aircraft Seats, Restraints, and Litters; and (5) Aircraft Postcrash Survival. This volume (Volume V) contains information on the aircraft postcrash environment and design techniques that can be used to reduce postcrash hazards. Topics include the postcrash fire environment, crashworthy fuel systems, ignition source control, fire behavior of interior materials, ditching survival, emergency escape, and crash locator beacons. (Author)

AD-A082 652/9 PC **A02/MF A01**
Aerospace Medical Research Lab Wright-Patterson AFB OH
USAF Bioenvironmental Noise Data Handbook. Volume 127. F-15A In-Flight Crew Noise,
Harald K. Hille. Aug 79, 15p Rept no. AMRL-TR-75-50-VOL-127
See also Volume 128, AD-A079 868.

The F-15A is a USAF air superiority fighter. This report provides measured data defining the bioacoustic environments at the pilot's location inside this aircraft for 30 flight conditions. Data are reported for one location in a wide variety of physical and psychoacoustic measures: overall and band sound pressure levels, C-weighted and A-weighted sound levels, preferred speech interference level, perceived noise level, and limiting times for total daily exposure of personnel with and without standard Air Force ear protectors. Refer to Volume 1 of this handbook, 'USAF Bioenvironmental Noise Data Handbook, Volume 1: Organization, Content and Application,' AMRL-TR-75-50(1) 1975, for discussion of the objective and design of the handbook, the types of data presented, measurement procedures, instrumentation, data processing, definitions of quantities, symbols, equations, applications limitations, etc. (Author)

AD-A082 653/7 PC **A06/MF A01**
Aerospace Medical Research Lab Wright-Patterson AFB OH
USAF Bioenvironmental Noise Data Handbook. Volume 139. E-3A Aircraft, Near and Far-Field Noise,
Robert G. Powell. Aug 79, 108p Rept no. AMRL-TR-75-50-VOL-139
See also Volume 140, AD-A079 875.

The USAF E-3A is an airborne warning and control system aircraft powered by four TF33-P-100A turbofan engines. This report provides measured and extrapolated data defining the bioacoustic environments produced by this aircraft operating on a concrete runup pad for four engine/power configurations. Near-field data are reported for nine locations in a wide variety of physical and psychoacoustic measures: overall and band sound pressure levels, C-weighted and A-weighted sound levels, preferred speech interference level, perceived noise level, and limiting times for total daily exposure of personnel with and without standard Air Force ear protectors. Far-field data measured at 19 locations are normalized to standard meteorological conditions and extrapolated from 75-8000 meters to derive sets of equal-value contours for these same seven acoustic measures as functions of angle and distance from the source. Refer to Volume 1 of this handbook, 'USAF Bioenvironmental Noise Data Handbook, Vol 1: Organization, Content and Application', AMRL-TR-75-50(1) 1975, for discussion of the objective and design of the handbook, the types of data presented, measurement procedures, instrumentation, data processing, definitions of quantities, symbols, equations, applications, limitations, etc. (Author)

AD-A082 654/5 PC **A07/MF A01**
Aerospace Medical Research Lab Wright-Patterson AFB OH
USAF Bioenvironmental Noise Data Handbook. Volume 141. F/A-18 Aircraft, Far-Field Noise,
Robert G. Powell. Jul 79, 126p Rept no. AMRL-TR-75-50-VOL-141
See also Volume 142, AD-A080 910.

The USN F/A-18 is a carrier based fighter-attack aircraft powered by two F404-GE-400 turbofan engines. This report provides far-field measured and extrapolated data defining both physical and psychoacoustic measures of the bioacoustic environments produced by this aircraft operating on a ground runup pad for five engine conditions. Far-field data measured at 19 locations are normalized to standard meteorological conditions and extrapolated from 75-8000 meters to derive sets of equal-value contours as a function of angle and distance from the source. These contours are measures of overall and band sound pressure levels, C-weighted and A-weighted sound levels, preferred speech interference level, perceived noise level, and limiting times for total daily exposure of personnel with and without standard Air Force ear protectors. Refer to Volume 1 of this handbook, 'USAF Bioenvironmental Noise Data Handbook, Vol 1: Organization, Content and Application', AMRL-TR-75-50(1) 1975, for discussion of the objective and design of the handbook, the types of data presented, measurement procedures, instrumentation, data processing, definitions of quantities, symbols, equations, applications, limitations, etc. (Author)

N80-20280/7 PC **A02/MF A01**
National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
Wing/Store Flutter with Nonlinear Pylon Stiffness.
R. N. Desmarais, and W. H. Reed, III. Apr 80, 8p NASA-TM-81789
Presented at the Aiaa/Asme/Asce/AHS 21ST Structures, Struct. Dyn. And Mater. Conf., Seattle, 12-14 May 1980.

Recent wind tunnel tests and analytical studies show that a store mounted on a pylon with soft pitch stiffness provides substantial increase in flutter speed of fighter aircraft and reduces dependency of flutter on mass and inertia of the store. This concept, termed the decoupler pylon, utilizes a low frequency control system to maintain pitch alignment of the store during maneuvers and changing flight conditions. Under rapidly changing transient loads, however, the alignment control system may allow the store to momentarily bottom against a relatively stiff backup structure in which case the pylon stiffness acts as a hardening nonlinear spring. Such structural nonlinearities are known to affect not only the flutter speed but also the basic behavior of the instability. The influence of pylon stiffness nonlinearities or the flutter characteristics of wing mounted external stores is examined.

PB80-910403 PC**$5.00/MF$5.00**
National Transportation Safety Board, Washington, DC. Bureau of Accident Investigation.
Aircraft Accident Report - Puerto Rico International Airlines, Inc. (PRINAIR) DeHavilland Heron, DH-114, N575PR, Alexander Hamilton Airport, Christiansted, St. Croix, U.S. Virgin Islands, July 24, 1979.
28 Mar 80, 62p NTSB-AAR-80-3
Paper copy also available on subscription, North American Continent price $50.00/year; all others write for quote.

About 0922 Atlantic standard time on July 24, 1979, Puerto Rico International Airlines, Inc., Flight 610, a deHavilland Heron DH-114, crashed on the airport while executing a takeoff from the Alexander Hamilton Airport, Christiansted, St. Croix, U.S. Virgin Islands. There were 19 passengers and 2 crewmembers on board. The first officer and 7 passengers were killed, and the captain and 12 passengers were injured seriously. The aircraft was destroyed. Witnesses saw the aircraft assume a nose-high attitude shortly after takeoff. The aircraft then began to roll to a left then to a right wing-down attitude, followed by a momentary pitch-down. The aircraft then pitched up and oscillated to a left wing-down and then a right wing down attitude while losing altitude. It struck the ground while in a right wing-down attitude. The gross weight of the aircraft at takeoff was found to be 1,060 lbs over its maximum allowable takeoff weight of 12,499 lbs., and the center of gravity was about 8 ins. beyond the maximum allowable rear limit.

1C. Aircraft

AD-A082 523/2 PC **A08/MF A01**
Goodrich (B F) Research and Development Center Brecksville OH
Evaluation of Advanced Non-Destructive Inspection Methods for Aircraft Tires.
Final rept. Feb 78-Aug 79,
Donald D. Ewing. Feb 80, 154p 3AT04G3, FAA-RD-80-10
Contract DOT-FA78WA-4103

Advanced Non-Destructive (NDT) Aircraft Tire Inspection Systems were evaluated and compared with the air needle inspection technique normally used to qualify air carrier aircraft tires for repair, retread, and return to service. The advanced NDT inspection systems considered were: the air needle buffing, holographic, pulse-echo ultrasound, and x-ray types. A description of the equipment, inspection procedure, typical visual displays, and analysis technique is included for each inspection system. A discussion of equipment state-of-art, tradeoffs, operator skills, required manning, and inspection rates is provided. Basic equipment, installation, and maintenance costs are provided. The effectiveness of the inspection systems in detecting, identifying type and size, and locating the position of defects is reported for a group of four old defective tires and four new tires with built-in defects which were inspected by all evaluated systems. Some recent or potential advances in state-of-art are discussed. (Author)

AD-A082 536/4 PC **A09/MF A01**
Texas Univ At Austin Dept of Aerospace Engineering and Engineering Mechanics
The Influence of Ballistic Damage on the Aeroelastic Characteristics of Lifting Surfaces.
Interim rept. 1 Feb 78-31 Jan 80,
D. S. Scott, J. C. Westkaemper, A. Sigal, and R. O. Stearman. Jul 79, 199p AFOSR-TR-80-0220
Grant AFOSR-78-3569

An investigation is carried out to determine whether ballistic damage can seriously degrade the aeroelastic integrity of lifting surfaces on aircraft. A promising aeroelastic failure mechanism is identified that results from the localized drag generated when a lifting surface encounters severe damage to its aerodynamic shape. This damage induced drag is shown to significantly decrease the divergence speed of a generic or statistical fighter wing for certain damage site locations while increasing the flutter speed of the wing. Consequently, a critical damage level exits where divergence becomes the critical aeroelastic instability for a wing which may still have adequate strength and flutter integrity. In view of the very limited information existing on the aerodynamic modeling of damaged lifting surfaces, a combined analytical and experimental modeling study was initiated to investigate the flow field in the vicinity of thru hole type damages on lifting surfaces. (Author)

AD-A082 616/4 PC **A11/MF A01**
United Technologies Corp Windsor Locks CT Hamilton Standard Div
V/STOL Rotary Propulsor Noise Prediction Model Update and Evaluation.
Final rept.,
B. Magliozzi. Dec 79, 233p FAA-RD-79-107
Update to Rept. nos. FAA-RD-76-49-1 through FAA-RD-76-49-3 dated May 76, AD-A027 389, AD-A027 390 and AD-A027 363.

The V/STOL Rotary Propulsor Noise Prediction Model developed under contract DOT-FA74WA-3477 was updated and evaluated. In the first phase, a literature review was conducted to identify and evaluate high quality noise measurements of propeller, variable pitch fan, fixed pitch fan, helicopter, lift fan, core engine, and jet noise for the preparation a of data base with emphasis on recent measurements of in-flight propulsors. In the second phase, the effects of forward flight on V/STOL propulsor noise were evaluated and the noise prediction model was improved to give better agreement with current measurements. Lastly, the performance of the noise prediction methodology was evaluated by comparison of calculations with measurements of propulsor noise from the data base. Although certain aspects of the measured propulsor noise, such as installation and ground reflection effects, caused discrepancies between measured and calculated levels (the calculations assume uninstalled propulsors under free-field conditions), the general correlation was good. Typical correlation between measured and calculated one-third octave band levels was + or - 5 dB and between measured and calculated dB(A), PNL, PNLT, and EPNL was + or - 3 dB.

AD-A082 688/3 PC **A07/MF A01**
General Dynamics Corp Fort Worth TX Fort Worth Div
V/STOL Propulsion-Induced Aerodynamics Hover Calculation Method.
Final technical rept. 19 Jan 79-19 Jan 80,
W. H. Foley, and J. A. Sansone. Feb 80, 132p
NADC-78242-60
Contract N62269-79-C-0212

An empirical method has been developed to predict the propulsive-induced forces on a V/STOL aircraft hovering in proximity of the ground. This method is applicable to configurations employing two, three, or four circular exhausts. Planform contour, nozzle pressure ratio, and lift improvement devices are considered. Accuracies on the order of one percent of propulsive thrust are demonstrated. (Author)

AD-A082 831/9 PC **A04/MF A01**
Army Aviation Engineering Flight Activity Edwards AFB CA
Flight Evaluation of Nondimensional Static Longitudinal Stability Test Methods.
Final rept. Nov 74-Feb 75,
Kenneth R. Ferrell, Barclay H. Boirun, and James E. Jenks, Jr. Jul 79, 67p Rept no. USAAEFA-74-07

Stability and control testing of helicopters at this activity has included performing discrete tests at representative mission conditions, as well as extremes of altitude, airspeed, vertical speed, rotor speed, gross weight, and center of gravity location. Special studies and tests concluded that the use of nondimensional parameters commonly used in performance analysis such as the thrust coefficient, advance ratio, and advancing tip Mach number could be used to reduce the number of independent test variables in stability and control testing. These studies also indicated that constant referred rotor speed might be better for isolation of compressibility effects than the conventional constant rotor speed method for obtaining nondimensional test data. This test investigated the relative advantage of obtaining static longitudinal stability and trim control data as a function of the nondimensional parameters using both the constant referred and constant rotor speed methods on a UH-1M helicopter. Within the accuracy of the test instrumentation, the static longitudinal trim control position data were found to be a function of thrust coefficient and advance ratio. The collective fixed static longitudinal stability was primarily a function of advance ratio only. The advancing tip Mach number did not have a significant effect on the longitudinal stability data on this test helicopter. Static longitudinal stability and control trim position can be defined by obtaining data over the full range of the thrust coefficient and advance ratio envelope and then using the nondimensional method to calculate intermediate value. (Author)

AD-A082 875/6 PC **A22/MF A01**
Joint Technical Coordinating Group for Munitions Development
Aircraft/Stores Compatibility Symposium Proceedings (4th) Held at Fort Walton Beach, Florida on 12-14 October 1977. Volume I.
Final rept.
Clifford L. Bore, Edward M. Schmidt, Edmund J. Gion, Keith G. Smith, and Edward Dankievitch. Oct 77, 510p Rept no. JTCG/MD-WP-12-VOL-1
See also Volume 2, AD-A082 876.

The purpose of this symposium was to bring together world-wide technical expertise to review and discuss aircraft/store compatibility developments and experiences. Technical papers in this volume discuss store, separation and aero/structures. Titles include: Influence of Aerodynamic Design of External Stores on Effectiveness/Cost Ratio of an Air Force; Muzzle Blast from AAH, 30mm, Area Weapon Subsystem; Kinetic Heating of Aircraft Conventional Armaments and Equipment; Electromagnetic Characteristics of Armament Equipment; Perturbed Motion of an Aircraft Following Jettisoning of a Store; A Rapid Predictive Method for Three-dimensional Transonic Flow Fields about Parent Aircraft with Application to External Stores; analytical Evaluation of the Limitations of Various Scaling Laws for Freedrop Store Separation Testing; Application of a General Purpose Dynamic Analysis Package to Problems of Store Separation; A Broad Based Technique for Prediction of Store Separation; Six-degrees-of-freedom System for Store Separation Studies in ONERA Wind Tunnels; A-10 Aircraft Store Certification Program Review; Evaluation of Prediction Methods for Aircraft/External Store Flutter Clearance; and Investigation of Unsteady Airloads on Wing-Store Configurations in Subsonic Flow.

AD-A082 876/4 PC **A99/MF A01**
Joint Technical Coordinating Group for Munitions Development
Aircraft/Stores Compatibility Symposium Proceedings (4th) Held at Fort Walton Beach, Florida on 12-14 October 1977. Volume II.
Final rept.,
Derek H. Peckman, C. Wayne Ingram, William M. Dyess, Jr., M. J. Twigger, and Dennis R. McGivern. Oct 77, 607p Rept no. JTCG/MD-WP-12-VOL-2
See also Volume 1, AD-A082 875.

The major topics in this volume are bomb racks/Interfaces and Experimental methods. Titles include: Aerodynamic Interactions of Stores and Airframes; AFATL Loads program--MACLIP(Maximum Aircraft Carriage Loads at Installed Positions); Proper Use of Military Specification MIL-A-8591E for Design of Stores to be Used by the USAF; Prediction of Ejection Release Unit Performance; Test Comparison of the Saddle Lug and Bail Lug Store Suspension and Release Systems; Impulse Cartridges as the Power Source for Stores Separation Equipment; Measurement of Suspension Loads and Determination of Suspension Reliability for a Store in the F-111 Weapons Bay; An Investigation of the Effects of External Stores on the Dynamic Stability of Aircraft; Simulation of Sway Braces and Mounting Gaps on Small-scale Models for Wind Tunnel Tests; Inflight Measurement of Aerodynamic Loads on Captive Stores; Generation of Aerodynamic Influence Coefficients from Aircraft-store Separation Kinematics; and Comparison of Flight Test Results and 6 DOF Calculations Using the Incremental Coefficient Method for Releases from the F-111 Weapons Bay.

AD-A082 936/6 PC **A06/MF A01**
National Aviation Facilities Experimental Center Atlantic City NJ
Advanced Concept in Aircraft Crash Firefighting Using Carbon Tetrafluoride.
Final rept. Oct 77-Jul 79,
George B. Geyer, Lawrence M. Neri, and Charles H. Urban. Mar 80, 108p FAA-NA-79-43, AFESC/ESL-TR-79-40
Contract D7C-8-114

The objective of this effort was to establish the feasibility of replacing a potentially lethal aircraft cabin environment with a cool habitable atmosphere which is nonsupportive of combustion during passenger evacuation in fire emergencies. For this purpose, carbon tetrafluoride (CF4) was chosen as the fire extinguishant because of its very low toxicity and high molecular stability under thermal insult. Four large-scale experiments were performed in the completely instrumented cabin of a DC7 aircraft employing both Class A and B combustible materials. Three experiments were performed using the habitable inert atmosphere (27-volume percent CF4) discharging at the rate of 3,300 cubic feet per minute into the aircraft cabin through a window exit. For comparative purposes, the fourth experiment was performed using neat CF4 discharged from two simulated points of fuselage penetration by a ballistically-powered aircraft skin penetrator nozzle. Both of these prototype fire extinguishing systems were designed to be employed by airport crash-fire-rescue services to extinguish aircraft cabin and compartment fires.

AD-A082 941/6 PC **A08/MF A01**
Boeing Military Airplane Co Seattle WA
Design Options Study.
Final rept.,
E. A. Barber, D. G. Blattner, R. J. Marhefka, M. Fligstein, and E. J. LaKous. 29 Feb 80, 158p
Rept no. D180-24258-3
Contract F33615-78-C-0114

This study considered a number of desired military features applied to a new commercial freighter and examined the commercial operating cost penalties and military life cycle costs. An I.O.C. of 1990 is projected for the new commercial freighter aircraft and the military design options, based upon a 1985 technology maturity date for the key technologies. The baseline aircraft incorporates graphite epoxy primary structure, active flight controls, advanced engines and aircraft systems. It appears that use of the dedicated commercial freighter uncompromised, but with selective military loading preprogrammed to optimize unit payloads, can provide a major portion of the airlift with only a minor increase in the organic fleet. One of the most pervasive influences in the study was the cost of the Enhanced CRAF provisions on the Design Options airplanes. Commercial pricing was used for both the baseline airplane and the provisions. However, because the CRAF provisions were developed and procured on a small unit buy relative to the baseline airplane the relative cost of the CRAF provisions are high, and significantly influence the results.

AD-A082 959/8 PC **A02/MF A01**
Advisory Group for Aerospace Research and Development Neuilly-sur-Seine (France)
Design, Development and Implementation of an Active Control System for Load Alleviation for a Commercial Transport Airplane,
R. F. O'Connell. Feb 80, 24p Rept no. AGARD-R-683
Presented at the Structures and Materials Panel Meeting (49th), Porz-Wahn, Germany, Oct 79.

An active control system for load alleviation has been developed for a long-range version of the Lockheed L-1011. This system, which permits the use of an extended wing span for fuel conservation with minimum structural change, will be introduced into commercial service in early 1980. The system is described and the criteria to which it is designed are discussed. Examples of flight test data obtained from a prototype version of the system installed on the flight test airplane are presented, and comparisons of these results with analytical predictions are shown. A basis for certification of such systems is presented, assuring a level of safety equivalent to that of a conventional design. (Author)

N80-20223/7 PC **A02/MF A01**
National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
Technology Requirements and Readiness for Very Large Aircraft.
D. W. Conner, and J. C. Vaughan, III. Mar 80, 14p NASA-TM-81783

Common concerns of very large aircraft in the areas of economics, transportation system inter-

faces and operational problems were reviewed regarding their influence on vehicle configurations and technology. Fifty-four technology requirements were identified which are judged to be unigue, or particularly critical, to very large aircraft. The requirements were about equally divided among the four general areas of aerodynamics, propulsion and acoustics, structures, and vehicle systems and operations. The state of technology readiness was judged to be poor to fair for slightly more than one-half of the requirements. In the classic disciplinary areas, the state of technology readiness appears to be more advanced than for vehicle systems and operations.

N80-20227/8 PC **A02**/MF **A01**
National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
A Spin-Recovery Parachute System for Light General-Aviation Airplanes.
C. Bradshaw. Apr 80, 18p NASA-TM-80237, L-13585
Submitted for Publication. Presented at the 14TH Aerospace Mech. Symp., Hampton, VA. 1-2 May 1980.

A tail mounted spin recovery parachute system was designed and developed by the NASA Langley Research Center for use on light general aviation airplanes. The system was designed for use on typical airplane configurations, including low wing, single engine, and twin-engine design. A mechanically triggered pyrotechnic slug gun is used to forcibly deploy a pilot parachute which extracts a bag that deploys a ring slot spin recovery parachute. The total system weighs 8.2 kg (18 lb). System design factors included airplane wake effects on parachute deployment, prevention of premature parachute deployment, positive parachute jettison, compact size, low weight, system reliability, and pilot and ground crew safety. Extensive ground tests were conducted to qualify the system. The recovery parachute was used successfully in flight 17 times.

N80-20232/8 PC **A03**/MF **A01**
Kentron International, Inc., Hampton, Va.
Aerodynamic Design and Analysis of the Ast-204, Ast-205, and Ast-206 Blended Wing-Fuselage Supersonic Transport Configuration Concepts.
G. L. Martin, and K. B. Walkley. Mar 80, 49p NASA-CR-159223
Contract NAS1-16000

The aerodynamic design and analysis of three blended wing-fuselage supersonic cruise configurations providing four, five, and six abreast seating was conducted using a previously designed supersonic cruise configuration as the baseline. The five abreast configuration was optimized for wave drag at a Mach number of 2.7. The four and six abreast configurations were also optimized at Mach 2.7, but with the added constraint that the majority of their structure be common with the five abreast configuration. Analysis of the three configurations indicated an improvement of 6.0, 7.5, and 7.7 percent in cruise lift-to-drag ratio over the baseline configuration for the four, five, and six abreast configurations, respectively.

N80-20260/9 PC **A02**/MF **A01**
National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
The Role of Technology as Air Transportation Faces the Fuel Situation.
C. Driver. Mar 80, 15p NASA-TM-81793
Presented at Upper Midwest Council, Minneapolis, 1 Nov. 1979.

Perspectives on the air transportation fuel situation are discussed including intercity air traffic, airline fuel consumption, fuel price effects on ticket price, and projected traffic and fuel useage between now and the year 2000. Actions taken by the airlines to reduce consumption are reviewed, as well as efforts currently underway to improve fuel consumption. Longer range technology payoffs resulting from NASA research programs are reviewed and results from studies on the use of alternate fuels are discussed.

N80-20261/7 PC **A03**/MF **A01**
Drexel Univ., Philadelphia, PA. Dept. of Mechanical Engineering and Mechanics.
A Singular Perturbation Analysis of Minimum Time Long Range Intercept.
Final Report.
A. J. Calise. Jan 80, 50p NASA-CR-162895
Grant NSG-1496

The application of singular perturbation theory for deriving algorithms suitable for on board real time computation of optimal aircraft trajectory control was investigated. Minimum time intercept in three dimensions was selected as a pilot problem formulation, and data for an early version F-4 aircraft was used to represent aircraft aerodynamic and propulsion characteristics. Results include the derivation of nonlinear, near optimal feedback control laws that are readily implementable in an aircraft flight computer, performance results for a variety of initial conditions (including optimal intercept at short ranges), and a point mass three dimensional simulation suitable for representing fighter aircraft under closed loop optimal control.

N80-20275/7 PC **A02**/MF **A01**
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, OH.
Optimum Subsonic, High-Angle-of-Attack Nacelles.
R. W. Luidens, N. O. Stockman, and J. H. Diedrich. 1979, 20p NASA-TM-81491, E-406
Prepared for the 12TH Congr. Of the Intern. Council of the Aeron. Sci., Munich, 13-17 Oct. 1980 and the 1980 Aerospace Congr. And Exposition, Los Angeles, 13-16 Oct. 1980; Sponsored by the Soc. Of Automotive Engr.

The optimum design of nacelles that operate over a wide range of aerodynamic conditions and their inlets is described. For low speed operation the optimum internal surface velocity distributions and skin friction distributions are described for three categories of inlets: those with BLC, and those with blow in door slots and retractable slats. At cruise speed the effect of factors that reduce the nacelle external surface area and the local skin friction is illustrated. These factors are cruise Mach number, inlet throat size, fan-face Mach number, and nacelle contour. The interrelation of these cruise speed factors with the design requirements for good low speed performance is discussed.

N80-20619/6 PC **A04**/MF **A01**
National Aeronautics and Space Administration. Ames Research Center, Moffett Field, CA.
On the Nonlinear Deformation Geometry of Euler-Bernoulli BEAMS.
D. H. Hodges, R. A. Ormiston, and D. A. Peters. Apr 80, 57p NASA-TP-1566, A-7985

Nonlinear expressions are developed to relate the orientation of the deformed beam cross section, torsion, local components of bending curvature, angular velocity, and virtual rotation to deformation variables. The deformed beam kinematic quantities are proven to be equivalent to those derived from various rotation sequences by identifying appropriate changes of variable based on fundamental uniqueness properties of the deformed beam geometry. The torsion variable used is shown to be mathematically analogous to an axial deflection variable commonly used in the literature. Rigorous applicability of Hamilton's principle to systems described by a class of quasi-coordinates that includes these variables is formally established.

PAT-APPL-6-126 064 PC **A02**/MF **A01**
National Aeronautics and Space Administration. Hugh L. Dryden Flight Research Center, Edwards, CA.
Apparatus for Damping Operator Induced Oscillations of a Controlled System.
Patent Application,
J. W. Edwards, and J. W. Smith. Filed 29 Feb 80, 24p N80-20488/6, NASA-CASE-FRC-11041-1
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

The invention relates to an adaptive filter for suppressing operator induced oscillations of a control system such as a pilot controlled aircraft or spacecraft. The novelty of the invention is in the filter arrangements which effectively estimate frequency and amplitude to produce a signal that will provide damping without rate limiting.

PAT-APPL-6-133 767 PC **A02**/MF **A01**
Department of the Air Force Washington DC
Aircraft Self-Sealing Fuel Tank and Method of Fabricating.
Patent Application,
Herbert F. Villemain. Filed 25 Mar 80, 11p AD-D007 124/1
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

Disclosed is a fabrication technique for, and the structure of, a flexible self-sealing fuel tank having a preactivated sealant constructed by laying-up over an innerliner, positioned on a form, prefabricated panels having a self-sealant member stitched into a rubber-coated outer wrap. (Author)

PATENT-4 198 877 Not available NTIS
Department of the Air Force Washington DC
Control Cable Fail Safe Device.
Patent,
Don W. Huling. Filed 7 Jul 78, patented 22 Apr 80, 5p AD-D007 156/3, PAT-APPL-922 603
Supersedes PAT-APPL-922 603-78, AD-D005 221.
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

A mechanical apparatus for retaining actuator control in the event of a failure in one of the two cables used to regulate a two cable quadrant type actuator. In response to a cable failure, the mechanism transforms the dual cable system into a tension loaded single cable configuration. Operationally, the failure of a cable releases its associated quadrant, which then rotates in response to a tension device acting between the two quadrants until it is driven against a fixed stop. The onset of the quadrant rotation actuates a quadrant lock device to prevent relative motion between the operable quadrant and the output actuation means. The tension device connecting the two quadrants now acts between the inoperable quadrant, resting against a fixed stop, and operable quadrant, such that the operable quadrant has a force tending to rotate it whenever the control cable tension is not balanced by the effects of the tension device. (Author)

1D. Aircraft Flight Control and Instrumentation

AD-A082 443/3 PC **A04**/MF **A01**
TriTec Inc Columbia MD
The Design, Fabrication, and Test of an Electrofluidic Servovalve.
Final rept. Sep 78-Oct 79,
Maurice F. Funke, and Lester K. Pecan. Feb 80, 57p USAAVRADCOM-TR-80-D-2
Contract DAAK51-78-C-0022

This report covers the design, fabrication, and testing of a dual input (hydraulic and electric) servovalve using fluidic amplifiers and positive derivative feedback. The design utilized a two-stage gain block to drive a hydraulic actuator. Electrical input signals were converted by a torque motor into mechanical motion of the first-stage flow splitter. Actuator position was fed back to a movable splitter in the second-stage amplifier. Flow to the actuator was augmented in a positive feedback sense by a spool valve whose flow was proportional to actuator velocity. Performance tests showed that the servovalve accepted and summed combinations of pressure and electrical inputs. Frequency response objectives were met without the high leakage flow penalty usually associated with this application of fluid amplifiers. (Author)

AD-A082 622/2 PC **A07**/MF **A01**
Missouri Univ-Columbia Coll of Engineering
Inherent Error in Asynchronous Digital Flight Controls.
Final rept. 1 Feb 78-31 Jul 79,
Charles Slivinsky, and Sudhiporn Patumtawapibal. Feb 80, 127p AFOSR-TR-80-0256
Grant AFOSR-76-2968

Contents: State Equations, Covariance, and Example for Basic Model; State Equations, Covariance, and Example for New Model; Algorithm for Estimator Tau*; The Operation of the New Model; Com-

parison Between Basic Model and New Model; and Summary and Recommendations.

AD-A082 770/9 PC **A04**/MF **A01**
Army Electronics Research and Development Command White Sands Missile Range NM Atmospheric Sciences Lab
Helicopter Remote Wind Sensor Flight Test.
Technical rept.,
David H. Dickson, and Jon E. Ottesen. Feb 80, 53p Rept no. ERADCOM/ASL-TR-0051

A flight test program has been completed in which the Helicopter Remote Wind Sensor was mounted on a UH-1 testbed aircraft. Wind measurements were made and recorded under a variety of flight hover conditions. Data from the flight test program are presented as wind profiles as a function of range, and data reduction and analysis approaches are discussed. The point-pair method was applied for comparison to theoretical and wind tunnel results. The data are applied to a baseline ballistics study sufficient to estimate the quantity of data needed for free-flight aerial armaments. (Author)

AD-A082 938/2 PC **A09**/MF **A01**
Federal Aviation Administration Washington DC Flight Standards Service
Report of the Aircraft Systems/Flight Test Workshop Held at East Point, Georgia on 8-17 November 1977.
Nov 77, 185p Rept no. FAA-AFS-130-78-1

No abstract available.

1E. Air Facilities

AD-A082 637/0 PC **A03**/MF **A01**
Federal Aviation Administration Washington DC Office of Aviation System Plans
A Review of the Airport Development Aid Program (ADAP) and Assessment of Future Program Needs.
Final rept. 1970-1978.
Jan 80, 49p Rept no. FAA-ASP-80-3

This report was prepared to assess the accomplishments of the Airport Development Aid Program (ADAP) authorized by the Airport and Airway Development Act of 1970. It was undertaken at this time as part of the process of developing a legislative proposal for Federal aid to airports after 1980. The report examines the $3.9 billion of Federal, State, and local expenditures that were made during fiscal years 1971 through 1978 and identifies areas where changes might be made to achieve a more effective Federal aid program for airports in the future. The report also provides a brief outline of accomplishments under the Planning Grant Program (PGP). (Author)

2. AGRICULTURE

2A. Agricultural Chemistry

PB80-170301 PC **A03**/MF **A01**
Instituto de Recursos Hilraulicos y Electrificacion, Panama City.
Utilizacion de la Pulpa de Cafe en la Produccion de Gas Combustible (Bio-Gas (Utilization of Coffee Pulp in the Production of Bio-Gas),
Samuel Bern. 1980, 50p
Text in Spanish. Sponsored in part by Agency for International Development, Washington, DC.

Presented in this report is the experimental work for the most part of the studies, not only achieved in the laboratory, but also on the field under different conditions for the process of anaerobic fermentation of the coffee pulp. The production of bio-gas was tested for a period of eight months. Conclusions, charts, and a bibliography are included.

2B. Agricultural Economics

PB80-168297 PC **E05**/MF **E05**
International Inst. for Applied Systems Analysis, Laxenburg (Austria).
The General Situation and Main Tendencies of Food and Agricultural Development in the European CMEA (Council for Mutual Economic Assistance) Member Countries (1960-1975 and up to 1980).
Final rept.,
Todor Popov. c1978, 103p RM-78-51

In the paper the agricultural development and basic policy objectives in the European CMEA (Council for Mutual Economic Assistance) member countries are discussed. The creation and development of general economic conditions for food and agricultural production is investigated. The utilization of land, productive livestock, mechanization and chemicals is estimated. The levels, trends and rates of production and consumption of the main agricultural products are presented together with the main aims, characteristic features and results of the contemporary agrarian policy in the CMEA countries. (Copyright (c) 1978 IIASA.)

PB80-169113 PC **A02**/MF **A01**
Farmer Cooperative Service, Washington, DC.
How to Start a Cooperative.
Educational circular 18,
Irwin W. Rust. 1963, 25p
Sponsored in part by Agency for International Development, Washington, DC.

The step by step outline of how to bring a cooperative into being starts out by explaining what a cooperative is. The steps it follows are: Arranging the first meeting; examining the need for a cooperative and estimating potential membership; management skills needed; facilities needed; operating costs; capitalization; drafting legal organization papers; first meetings of members and board of directors; and general rules for success. The rules for success are explained and cover legal matters, expert help, management, flexibility, and quorums. A sample survey report and a sample organization agreement are included as appendices.

PB80-169717 PC **A02**/MF **A01**
Denver Research Inst., CO. Office of International Programs.
Central America: Fungal Fermentation of Coffee Waste,
Suellen Sebald Edwards. Dec 79, 24p
Contract AID/ta-C-1337
Report on Industrial Research Institutes: Their Role in the Application of Appropriate Technology and Development, Case Series No. 6.

The case history has been written to assist development planners, personnel of industrial research institutes, and USAID mission personnel in understanding the role that IRIs can and do play in the application of technology to development. It describes the fungal fermentation of a coffee waste program under way in Guatemala and El Salvador that will result in useful protein byproducts. The cultivation of fungi on the coffee pulp juice represents a useful technological advance for less developed countries--it will help the control of some of the pollution involved with coffee production.

PB80-170079 PC **A02**/MF **A01**
Ministerio de Desarrollo Agropecuario, Panama City.
Laboratorios Experimentales Para la Formacion de Cuadros Organizadores de Empresas de Auto Gestion Campesina (Experimental Laboratories for Organizing Boards of Farming Enterprises),
Ivan Labra. Nov 77, 14p
Text in Spanish. Sponsored in part by Agency for International Development, Washington, DC.

The report is an exposition of basic concepts for the organizing of ideas of individual conscience that evolves according to the type of productive activity to be performed. It analyzes the application of laboratories for the organization of country workers in Panama. The social composition of the groups as well as the equipment necessary and functions of the participants are described.

2C. Agricultural Engineering

EGG-2005 PC **A03**/MF **A01**
Idaho National Engineering Lab., Idaho Falls.
Effects of Irrigation on Crops and Soils with Raft River Geothermal Water.
N. E. Stanley, and R. C. Schmitt. Jan 80, 30p
Contract EY-76-C-07-1570

The Raft River Irrigation Experiment investigated the suitability of using energy-expended geothermal water for irrigation of selected field-grown crops. Crop and soil behavior on plots sprinkled or surface irrigated with geothermal water was compared to crop and soil behavior on plots receiving water from shallow irrigation wells and the Raft River. In addition, selected crops were produced, using both geothermal irrigation water and special management techniques. Crops irrigated with geothermal water exhibited growth rates, yields, and nutritional values similar to comparison crops. Cereal grains and surface-irrigated forage crops did not exhibit elevated fluoride levels or accumulations of heavy metals. However, forage crops sprinkled with geothermal water did accumulate fluorides, and leaching experiments indicate that new soils receiving geothermal water may experience increased salinity, exchangeable sodium, and decreased permeability. Soil productivity may be maintained by leaching irrigations. (ERA citation 05:011759)

PAT-APPL-6-132 583 PC **A02**/MF **A01**
Department of Agriculture, Washington, DC.
Vacuum-Operated Produce Handling Systems.
Patent Application,
Bernard R. Tennes, Richard J. Wolthuis, and Clyde L. Burton. Filed 21 Mar 80, 13p PB80-165541
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

This invention relates to the handling of fruits and vegetables during and after field harvesting. A novel flume hopper is employed in combination with a vacuum-operated hydraulic conveyor in a field or storage handling system for efficiently transferring produce to a holding tank without inflicting damage.

PATENT-4 195 695 Not available NTIS
Department of Agriculture, Washington, DC.
Land Imprinter.
Patent,
Robert M. Dixon. Filed 30 Dec 77, patented 1 Apr 80, 6p PB80-166487, PAT-APPL-866 079 Supersedes PB-277 505.
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

The invention describes a method and apparatus for treatment of land surfaces is disclosed. The land surface is imprinted by means of imprint capsules of alternating geometries--one being a water-runoff-directing geometry; the other, a water-infiltration-enhacing geometry. The method prevents water runoff and enhances water infiltration into the soil in areas where high moisture levels would be desirable, such as in seed beds and at the base of growing plants.

PB80-169360 PC **A02**/MF **A01**
Nebraska Univ. Panhandle Station at Scottsbluff.
Suitability of Region-Wide Irrigation Scheduling by Local Evapotranspiration Measurement.
Completion rept.,
Walter L. Trimmer. Mar 80, 25p W80-04442, OWRT-A-050-NEB(1)
Contract DI-14-34-0001-9029

Irrigation scheduling requires an estimate of evapotranspiration (ET) to provide a means of determining when to irrigate and with how much water. Measuring ET or crop water use at every site is too expensive. Three sites in the Nebraska Panhandle were chosen as measurement sites. The three formed a triangle approximately 95 km on a side and represented three distinct different climates. Three years ET data for June through August showed relatively little difference between the sites. Norman instrument error explained a great deal of the variation. Instrument calibration, including hygrothermographs and silicon cell pyranometers, proved difficult and illustrated that the fewest number of measurement sites was optimum.

PB80-169733 PC **A02**/MF **A01**
Denver Research Inst., CO. Office of International Programs.

The Republic of Korea: An Example of Integrated Regional Development,
Donald D. Evans. Dec 79, 24p
Contract AID/ta-C-1337
Report on Industrial Research Institutes: Their Role in the Application of Appropriate Technology and Development, Case Series No. 8.

The case history has been written to assist development planners, personnel of industrial research institutes, and USAID mission personnel in understanding the role that IRIs can and do play in the application of technology to development. It describes the Korea Institute of Science and Technology's (KIST) efforts to provide regional development on a 703 square mile island. Research and Development includes programs for producing a high-nutrition cattle feed, improved orange processing and shipping methods, design and partial testing of a small, wind-powered electric generating system, and other technical and economic studies.

PB80-170061 PC **A05**/MF **A01**
Michigan Univ., Ann Arbor. Wetlands Ecosystem Research Group.
Wetland Utilization for Management of Community Wastewater, Operations Summary, 1979, Houghton Lake Wetlands Treatment Project,
Robert H. Kadlec, and David E. Hammer. Feb 80, 83p NSF/RA-800026
Grant NSF-ENV77-23868
See also report dated Mar 79, PB-298 308.

The Houghton Lake Wetland Treatment System operated successfully in the treatment of 65 million gallons of secondary wastewater in the summer of 1978, and 101 million gallons in 1979. Treated wastewater from a holding pond is pumped through a 12 inch diameter underground force line to the edge of the Porter Ranch peatland. The water is distributed evenly across the width of the peatland through small gated openings in the discharge pipe. Each of the 100 gates discharge approximately 16 gallons per minute, under typical conditions, and the water spreads slowly over the peatland. Results are presented under the following topic areas: system operation, hydrology, surface water chemistry, litter and soil, vegetation status and response, and algal productivity.

2D. Agronomy and Horticulture

PAT-APPL-6-132 597 PC **A02**/MF **A01**
Department of Agriculture, Washington, DC.
Mushroom-Growing Medium.
Patent Application,
Ralph H. Kurtzman, Jr. Filed 21 Mar 80, 12p
PB80-165525
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

This invention is related to and has among its objects the provision of novel mushroom-growing media and novel methods of making the same. A cellulosic medium for growing mushrooms is disclosed. A liquid mixture containing sources of soluble carbon and nitrogen is fermented and mixed with cellulosic material. The so-treated cellulosic material is held at a temperature and for a time sufficient to allow substantial reduction of organisms damaging to mushroom culture. The cellulosic material then is cooled to a temperature suitable for spawning.

PB80-167448 PC **A11**/MF **A01**
Department of Agriculture, Washington, DC.
Variations in the Physiological and Hormonal States of Cotton Fruit and Their Relationship with the Initiation of Abscission.
Doctoral thesis,
Michel Cognee. 28 Feb 75, 249p TT-77-59134
Trans. of mono. Variations de l'Etat Physiologique Et Hormonal des Fruits de Cotonnier et leurs Relations avec le Declenchement Ulterieur de l'Abscission, Paris. Sponsored in part by National Science Foundation, Washington, DC. Special Foreign Currency Science Information Program.

Shedding of cotton bolls is a phenomenon whose economical importance is evident. In most cases, more than half of the potential production of mature bolls is lost during the fruiting period. Because of the magnitude of losses caused by abscission, cotton specialists tried to overcome this phenomenon a long time ago. Two main methods could be followed to restrict boll abscission. The author describes the physiological mechanism, and selectively inhibits facets of it to limit boll loss. Chemical substances of a diverse nature are applied to the plant to see if some of them would produce the desired results.

PB80-168438 PC **E02**/MF **E02**
International Inst. for Applied Systems Analysis, Laxenburg (Austria).
On Energy and Agriculture: From Hunting-Gathering to Landless Farming.
Final rept.,
C. Marchetti. cDec 79, 23p RR-79-10

An energy analysis of agriculture shows very coherent patterns of evolution from the neolithic age up to this century. All technical advances were in fact exploited toward intensification and the ratio of food output to energy input was held remarkably constant over such a long stretch of time. New agricultural practices in developed countries linked to massive energy 'subsidies' from fossil fuels have disrupted the trend, substantially altering these practices. Low-tillage techniques, hormonal and genetic pesticides and herbicides, nitrogen fixing in grains, and other emerging technologies satisfying this constraint are briefly described and assessed in this paper. (Copyright (c) 1979 International Institute for Applied Systems Analysis.)

PB80-170087 PC **A04**/MF **A01**
Escuela Politecnica Nacional, Quito (Ecuador).
Industrializacion de la Papaya (Industrialization of the Papaya).
Technical bulletin no. 9,
Luis Leon Orellana. Nov 74, 54p
Text in Spanish. Sponsored in part by Agency for International Development, Washington, DC.

The origin, characteristics, types, maturation, storage, and zones of production of the papaya are presented and the preservation and utilization are described. Tables indicating the proportions of papaya to other fruits in canned production are given. An organized production plan for papaya in Ecuador is outlined.

PB80-174485 PC **A13**/MF **A01**
Agricultural Research Service, Washington, DC.
Methods for Increasing Plant Protein.
1980, 295p TT-79-52147
Trans. of mono. Rezervy Uvelicheniya Proizvodstva Rastitel'nogo Belka, Moscow, 1972. Sponsored in part by National Science Foundation, Washington, DC. Special Foreign Currency Science Information Program.

This book deals with the experience in increasing the production of plant protein. It describes measures ensuring increased yields of forage crops and protein output such as improvement and rational use of hayfields and pastures, laying of cultivated long standing pastures, correct choice of grass mixtures for fodder and field crop rotations, cultivation of annual legumes and pulse crops for fodder, intensive use of arable land by adopting catchcrop and mixed sowing of forage crops and organization of raw material resources for the production of protein-vitamin grass meal.

2E. Animal Husbandry

PB80-169493 PC **A03**/MF **A01**
Saint Jude Children's Research Hospital, Memphis, TN.
National and International Surveillance of Influenza Viruses Among Domestic and Wild Species of Animals.
Final rept. 1 Jul 77-30 Jun 78,
R. G. Webster. 30 Jun 78, 32p DAB-VDP-06-59
Contract N01-AI-5-2524
See also PB-296 435.

The national and international network for the surveillance of influenza viruses in animals and birds has concentrated on the following areas of study in the current year. (1) Surveillance of swine for the prevalence of influenza viruses and evidence for interspecies transmission. (2) Surveillance of domestic and feral avian species for the prevalence of influenza viruses. (3) Any evidence that the A/USSR/90-77 (H1N1) strain may have emerged from lower animals or birds. (4) Establishment of methods for selection of animal influenza virus strains that may be used as future vaccine strains for potential use in man. The laboratories have continued to cooperate with the World Health Organization and participated in the organization of an international meeting on the ecology of influenza viruses, funded jointly by the World Health Organization and through the Fogarty International Center. Attendance at this meeting by representatives from the People's Republic of China and their subsequent visit to this center, indicates an increased interest in studies on the ecology of influenza viruses by scientists from the People's Republic of China. Three international laboratories from Hong Kong, Taiwan and Colombia, South America have received funds for this program. The results obtained from both national and international surveillance are used in this report to provide answers to the specific areas of study in the workscope.

2F. Forestry

CEA-CONF-4236 PC **A03**/MF **A01**
CEA Centre d'Etudes Nucleaires de Cadarache, Saint-Paul-les-Durance (France). Service de Protection contre les Rayonnements.
Study of Aircraft Dropped Fire-Extinguishers Spreading, Using Sodium 24 as Tracer.
M. Grandin. Oct 77, 26p CONF-7710204-2
In French.10 congress on the control of ionizing radiation, Aix-en-Provence, France, 26 Oct 1977. U.S. Sales Only.

To increase efficiency of aircraft dropped fire extinguishers in a burning forest a test was carried out at Cadarache. Sodium 24 was added to get continuous report of deposits, to avoid variability in dropping conditions and to get a better 3D picture. Comparison was made with a non-radioactive tracer: uranin S. Emphasis is put on safety during the test. (Atomindex citation 10:463509)

3. ASTRONOMY AND ASTROPHYSICS

3B. Astrophysics

AD-A082 571/1 PC **A02**/MF **A01**
Air Force Geophysics Lab Hanscom AFB MA
Prediction of the Time-Intensity Profile of Solar Proton Events,
D. F. Smart. 1979, 5p Rept no. AFGL-TR-80-0005
Pub. in Proceedings of the Indo-US Workshop on Solar Terrestrial Physics, p81-84 1979.

No abstract available.

AD-A082 944/0 PC **A02**/MF **A01**
Colorado Univ At Boulder
On the Angular Momentum Loss of Late-Type Stars,
B. R. Durney, and J. Latour. 23 Jun 77, 17p
AFGL-TR-80-0079
Contract F19628-77-C-0104, Grant NGL-06-003-057
Pub. in Geophysical and Astrophysical Fluid Dynamics, v9 p241-255 1978.

No abstract available.

AD-A083 030/7 PC **A02**/MF **A01**
Stanford Univ CA Inst for Plasma Research
The Origin of the Warped Heliospheric Current Sheet.
Scientific technical rept.,
J. M. Wilcox, P. H. Scherrer, and J. T. Hoeksema. Mar 80, 15p Rept no. SU-IPR-803
Contracts N00014-76-C-0207, NAS5-24420
Sponsored in part by Grants NGR-05-020-559 and NSF-ATM77-20580.

The warped heliospheric current sheet in early 1976 is calculated from the observed photospheric magnetic field using a potential field method. Comparisons with measurements of the interplanetary magnetic field polarity in early 1976 obtained at

several locations in the heliosphere at Helios I, Helios II, Pioneer XI and Earth show a rather detailed agreement between the computed current sheet and the observations. It appears that the large-scale structure of the warped heliospheric current sheet is determined by the structure of the photospheric magnetic field, and that 'ballerina skirt' effects may add small-scale ripples. (Author)

AD-A083 031/5 PC **A02**/MF **A01**
Stanford Univ CA Inst for Plasma Research
Doppler Observations of Solar Rotation.
Scientific technical rept.,
P. H. Scherrer, and J. M. Wilcox. Mar 80, 11p
Rept no. SU-IPR-804
Contracts N00014-76-C-0207, NAS5-24420
Sponsored in part by Grants NGR-05-020-559 and NSF-ATM77-20580.

Daily observations of the photospheric equatorial rotation rate using the Doppler effect are made at the Standford Solar Observatory. These observations show no variations in the rotation rate that exceed the observational error of about one percent. The average rotation rate is indistinguishable from that of sunspots and large-scale magnetic field structures. (Author)

JINR-E-1-11774 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of High Energy.
Discovery of Resonances in Multibaryon Systems. Pt. 1. The Hypercharge Selection Rule Governs the Hadronic Resonance Formation. Multibaryon Resonances Are Ultra-High Density Superstrange Objects.
B. A. Shahbazian. 1978, 10p
U.S. Sales Only.

The properties of multibaryon resonances discovered in the collisions of fast neutrons and pions minus with the C exp 12 nuclei at 7.0 and 4.0 GeV/c momenta, respectively, in the JINR propane bubble chamber have been investigated. It has been shown that due to the hypercharge selection rule (Y<=1) found earlier multibaryon resonances are ultra-high density superstrange objects. The hypothesis has been brought up: the central regions of galaxies and quasars up to certain densities are huge multibaryon or even multihyperon resonances. (Atomindex citation 10:439759)

LA-UR-80-22 PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
Pre-Main Sequence Sun: A Dynamic Approach.
M. J. Newman, and K. H. A. Winkler. 1979, 18p
CONF-7910123-1
Contract W-7405-ENG-36
Lunar and Planetary Institute topical conference on the ancient sun, Boulder, CO, USA, Oct 1979.

The classical pre-main sequence evolutionary behavior found by Hayashi and his coworkers for the Sun depends crucially on the choice of initial conditions. The Hayashi picture results from beginning the calculation with an already centrally condensed, highly Jeans unstable object not terribly far removed from the stellar state initially. The present calculation follows the work of Larson in investigating the hydrodynamic collapse and self-gravitational accretion of an initially uniform, just Jeans unstable interstellar gas-dust cloud. The resulting picture for the early history of the Sun is quite different from that found by Hayashi. A rather small (R approx. = 2 R/sub sun/), low-luminosity (L greater than or equal to L/sub sun/) protostellar core develops. A fully convective stellar core, characteristic of Hayashi's work, is not found during the accretion process, and can only develop, if at all, in the subsequent pre-main sequence Kelvin-Helmholtz contraction of the core. 3 figures, 1 table. (ERA citation 05:014452)

LA-UR-80-278 PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
Ground Based Automated Telescope.
S. A. Colgate, and W. Thompson. 1980, 12p
CONF-800116-1
Contract W-7405-ENG-36
Optical and infrared program conference, Tucson, AZ, USA, 7 Jan 1980.

Recommendation that a ground-based automated telescope of the 2-meter class be built for remote multiuser use as a natural facility. Experience dictates that a primary consideration is a time shared multitasking operating system with virtual memory overlayed with a real time priority interrupt. The primary user facility is a remote terminal networked to the single computer. Many users must have simultaneous time shared access to the computer for program development. The telescope should be rapid slewing, and hence a light weight construction. Automation allows for the closed loop pointing error correction independent of extreme accuracy of the mount. (ERA citation 05:014125)

LA-UR-80-80 PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
LASL Gamma-Ray Burst Astronomy Program.
R. W. Klebesadel, 1979, 13p CONF-791164-1
Contract W-7405-ENG-36
Conference on cosmic gamma ray bursts, Toulouse, France, 25 Nov 1979.

Satellite observations of cosmic gamma bursts during the period from 1967 through 1979 by LASL are reviewed. The Vela, Pioneer Venus, and ISEE-3 instrument observations are discussed. (ERA citation 05:012702)

LA-8085-MS PC **A05**/MF **A01**
Los Alamos Scientific Lab., NM.
Solar Photo Rate Coefficients.
W. F. Huebner, and C. W. Carpenter. Oct 79, 97p
Contract W-7405-ENG-36

Photo rate coefficients based on wavelength dependent solar photon flux at 1 AU heliocentric distance have been determined for atomic hydrogen, carbon, nitrogen, and oxygen, and for some molecules formed from these elements. Branching ratios are considered for the various modes of decay of these molecules. Rates for some metastable states have been estimated. 107 references. (ERA citation 05:012703)

NORDITA-78-15(rev.) PC **A04**/MF **A01**
Nordisk Inst. for Teoretisk Atomfysik, Copenhagen (Denmark).
Neutron Star Neutrino Emissivities.
B. L. Friman, and O. V. Maxwell. Feb 79, 65p
U.S. Sales Only.

The authors obtain analytical expressions for the URCA and neutral current bremsstrahlung emissivities from neutron stars. (Atomindex citation 10:478246)

N80-21234/3 PC **A03**/MF **A01**
Missouri Univ. -Rolla. Dept. of Chemistry.
Transport Properties in the Atmosphere of Jupiter.
Semiannual Progress Report, Jul. - Dec. 1979.
L. Biolsi, Jr. 1979, 35p NASA-CR-162897
Grant NSG-1369

The computer program used to obtain transport properties for the Hulburt-Hirschfelder potential was tested. Transport properties for the C-C interaction were calculated. Rough estimates for transport properties for the important ablation species were obtained as well as estimates of transport properties for some of the species associated with photochemical smog. The results are discussed.

N80-21235/0 PC **A06**/MF **A01**
Atmospheric and Environmental Research, Inc., Cambridge, MA.
Outer Satellite Atmospheres: Their Extended Nature and Planetary Interactions.
Final Report, Feb. 1979 - Mar. 1980.
W. H. Smyth. Apr 80, 104p NASA-CR-162902, FR-7
Contract NASW-3174

Highly developed numerical models are applied to interpret extended-atmosphere data for the sodium cloud of Io and the hydrogen torus of Titan. Solar radiation pressure was identified and verified by model calculations as the mechanism to explain two different east-west asymmetries observed in the sodium cloud. Analysis of sodium line profile data, suggesting that a Jupiter magnetospheric wind may be responsible for high speed sodium atoms emitted from Io, and preliminary modeling of the interaction of the Io plasma torus and Io's sodium cloud are also reported. Models presented for Titan's hydrogen torus are consistent both with the recent Pioneer 11 measurements and earlier Earth-orbiting observations by the Copernicus satellite. Progress is reported on developing models for extended gas and dust atmospheres of comets.

N80-21237/6 PC **A08**/MF **A01**
Lockheed Missiles and Space Co., Palo Alto, CA.
Analysis of Time Dependent Phenomena Observed with the LPSP OSO-8 Instrument.
Final Report.
J. W. Leibacher. 15 Oct 79, 170p NASA-CR-162908
Contract NASW-3053

Data obtained by the Laboratoire de Physique Stellaire et Planetaire's ultraviolet spectrometer onboard the OSO-8 spacecraft were analyzed in an effort to dynamically model the solar chromosphere as an aid in enhancing knowledge of the dynamical processes themselves and of spectral line formation in the dynamic chromosphere. Repeated spectral scans of strong, optically thick resonance lines formed in the solar chromosphere were examined for indications of oscillatory velocities and intensities among other indications of velocity which were studied, the blue peak is reasonably well defined, and the position of a parabolic filter fitted by the least squares method was used to define it. Observed chromospheric oscillation periods are discussed as well as the variations in altitude of the emitting region which result primarily from the motion up and down during the oscillation.

N80-21238/4 PC **A02**/MF **A01**
Stanford Univ., CA. Inst. of Plasma Studies.
Doppler Observations of Solar Rotation.
P. H. Scherrer. Mar 80, 11p NASA-CR-162886, SU-SUIPR-804
Contracts NAS5-24220, N00014-76-C-0207
Submitted for Publication.

Daily observations of the photospheric equatorial rotation rate using the Doppler effect mode at the Sanford Solar Observatory are presented. These observations show no variations in the rotation rate that exceed the observational error of about one percent. The average rotation rate is indistinguishable from that of sunspots and large scale magnetic field structures.

N80-21240/0 PC **A03**/MF **A01**
Stanford Univ., CA. Inst. of Plasma Research.
The Rotation of the Sun: Observations at Stanford.
J. M. Scherrer, J. M. Wilcox, and L. Svalgaard.
Feb 80, 34p NASA-CR-162914, SU-SUIPR-799
Contracts NAS5-24420, NGR-05-020-559

Daily observations of the photospheric rotation rate using the Doppler effect made at the Stanford Solar Observatory since May 1976 are analyzed. Results show that these observations show no daily or long period variations in the rotation rate that exceed the observational error of about one percent. The average rotation rate is the same as that of the sunspot and the large-scale magnetic field structures.

ORO-3992-370 PC **A02**/MF **A01**
Texas Univ., Austin. Center for Particle Theory.
Primordial Synthesis of Anomalous Nuclei.
D. A. Dicus, and V. L. Teplitz. Sep 79, 14p
Contract EY-76-S-05-3992

The abundances of anomalous light, $Z > 1$ nuclei that would be produced by primordial cosmic nucleosynthesis if there exist neutral, stable, strongly interacting baryons are calculated. The light element most sensitive to a small primordial abundance of such a baryon is beryllium. (ERA citation 05:010708)

PB80-174527 PC **A09**/MF **A01**
National Geophysical and Solar-Terrestrial Data Center, Boulder, CO.
Solar-Geophysical Data Number 422, October 1979. Part I (Prompt Reports). Data for September 1979 - August 1979,
Helen E. Coffey. Oct 79, 183p SGD-422-PT-1, NOAA-79112302
See also PB80-174535 and PB80-128747.

This prompt report provides data for September 1979 on: alert periods, daily solar indices, solar flares, solar radio emission, spacecraft observations, coronal holes, solar wind measurements, inferred interplanetary magnetic field polarities, mean solar magnetic field, and Boulder Geomagnetic Substorm Log. It also provides data for August 1979 on: daily solar activity center, sudden ionospheric disturbances, solar x-ray radiation, solar radio emission, cosmic rays, geomagnetic indices, and radio propagation indices.

PB80-174535 PC **A05**/MF **A01**
National Geophysical and Solar-Terrestrial Data Center, Boulder, CO.
Solar-Geophysical Data Number 422, October 1979. Part II (Comprehensive Reports). Data for April 1979, February 1979,
Helen E. Coffey. Oct 79, 96p SGD-422-PT-2, NOAA-79112303
See also PB80-174527 and PB80-128754.

This comprehensive report provides data for April 1979 on: solar radio emission, energetic solar particles and plasma, and solar x-ray radiation. The data for February 1979 consists of: solar flares, synoptic charts, and abbreviated calendar record. The miscellaneous data includes daily solar indices, solar radio emission for July and August 1979, solar wind measurements for August 1979, geomagnetic indices July 1979, and regional flare index for January 1979.

TRITA-EPP-79-08 PC **A03**/MF **A01**
Royal Inst. of Tech., Stockholm (Sweden). Institutionen foer Plasmafysik.
Annihilation Model of the QSOs.
H. Alfven. Apr 79, 44p
U.S. Sales Only.

An attempt is made to develop a simple phenomenological model of QSOs based on star-antistar collisions. This model can account for such basic observational properties as the acceleration to very large (noncosmological) velocities, the existence of broad emission lines, and at the same time narrow absorption lines with different redshifts. The absence of blue-shifts is also explained. The model predicts that relatively young QSOs should be at cosmological distances whereas the old ones may very well be much closer to us than indicated by their redshift. (Atomindex citation 10:478199)

UCRL-80972(Rev.2) PC **A02**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
History of the Sun's Luminosity, 0 to 460,000 BP, Based on the Geologic Record in Light of Recent Climate Theory.
J. A. Viecelli. Jan 80, 17p CONF-791231-1
Contract W-7405-ENG-48
17. General Assembly of the International Union of Geodesy and Geophysics, Canberra, Australia, Dec 1979.

A solar luminosity index extending 460,000 years into the past is computed from ocean surface temperatures derived from the geologic record. It is estimated that the sun's luminosity fluctuated between 2% above to 5% below the current value over this period. The index shows pulses occurring at intervals of 75,000 to 120,000 years. (ERA citation 05:012704)

4. ATMOSPHERIC SCIENCES

4A. Atmospheric Physics

AD-A082 453/2 PC **A08**/MF **A01**
Alaska Univ Fairbanks Inst of Marine Science
Dynamics of the Exchange of Carbon Dioxide in Arctic and Subarctic Regions,
John J. Kelley. 1973, 155p
Contracts N00014-67-A-0317-0001, N00014-67-A-0103-0007
Sponsored in part by Grants NSF-GB-8274, NSF-GA-33387 and NSF-GV-29343.

The dynamics of atmospheric carbon dioxide interaction with the ocean and land masses is manifested in subtle fluctuations and long-term trends. Measurements over the past 100 years indicate that there has been an increase in atmospheric carbon dioxide as a result of the industrial revolution. Theories have been formulated on how an increase in carbon dioxide might effect climatic change, but the validity of historical data collection remains uncertain. A study was initiated in 1961 to accurately document the concentration and variation of carbon dioxide in the arctic atmosphere near Barrow, Alaska. Carbon dioxide in air was measured continuously by infrared analysis and the use of reference gases calibrated with precision in a cooperative program of CO2 observations in Hawaii and the Antarctic. Carbon dioxide is increasing at a rate of approximately 0.8 parts per million by volume per year in the arctic atmosphere, as well as in the tropics and the Antarctic. The seasonal variation for CO2 in the air, greatest in the Arctic and very small in the Antarctic, is primarily a response to photosynthetic utilization of carbon dioxide by terrestrial plants in the northern hemisphere.

AD-A082 481/3 PC **A02**/MF **A01**
National Science Foundation Washington DC
Photometric and Interferometric Observations of the SAR ARC Event of September 25/26, 1978,
S. Okano, and J. S. Kim. 4 Jan 79, 7p AFOSR-TR-79-1207
Grants AFOSR-ISSA-78-0029, NSF-ATM78-05739
Pub. in Jnl. of Geophysical Research, v84 nA8 p4441-4445, 1 Aug 79.

No abstract available.

AD-A082 601/6 PC **A02**/MF **A01**
Hill (Robert D) Montecito CA
On the Production of Nitric Oxide by Lightning,
Robert D. Hill. 5 Sep 79, 4p
Contract N00014-80-C-0293
Pub. in Geophysical Research Letters, v6 n12 p945-947 Dec 79.

No abstract available.

AD-A082 793/1 Not available NTIS
Defence Research Establishment Valcartier (Quebec)
The Effects of Relative Humidity on the Infrared Aerosol Extinction in the 3-5 and 8-15 Micrometers Spectral Regions,
W. G. Tam, and C. Boily. 26 Jun 78, 13p DRB-REPRINT-4232
Availability: Pub. in Infrared Physics, v19 n2 p151-162 1979 (No copies furnished by DTIC).

No abstract available.

AD-A083 010/9 MF **A01**
Smithsonian Astrophysical Observatory Cambridge MA
Calculations Pertaining to the Energy Balance and Plasma Motions in the Ionosphere.
Final rept. 1 Jan-30 Sep 78,
Alexander Dalgarno, and Eustratios Constantinides. Nov 79, 142p AFGL-TR-79-0270
Contract F19628-78-C-0047
Availability: Microfiche copies only.

Plasma motions in the upper atmosphere have been investigated with the aid of satellite data. It is shown that the major ion, O(+), moves in response to the sum of the forces on itself and on electrons. Major ions follow the motion of the major ion. The observed plasma velocity in the vertical direction is in harmony with the assumption of an eastward electric field of between 3 and 5 millivolts per meter. The present investigation demonstrates clearly the need for measurements of electric fields and plasma drifts. (Author)

AD-A083 025/7 PC **A03**/MF **A01**
Cincinnati Univ OH Dept of Physics
Theoretical Investigation of the Effects of Atmospheric Gravity Waves on the Hydroxyl Emissions of the Atmosphere.
Final rept. 15 Jul 78-30 Nov 79,
Tai-Fu Tuan. 31 Dec 79, 41p AFGL-TR-80-0007
Contract F19628-78-C-0208

The effect of gravity waves on OH emission is investigated using a gravity-wave model valid for an inhomogeneous atmosphere and computed as well as semi-empirical data for the 'undisturbed' ozone and hydrogen profiles. The results show that (1) the magnitude of the response depends on the relative magnitudes and signatures of the vertical and horizontal wave-induced diffusion. Since in some regions the horizontal velocity field of the gravity wave can increase much more rapidly with height than the vertical field, horizontal diffusion even when there is a relatively sharp layer gradient; and (2) The structures in the OH profile produced by the gravity wave are in general but not always more pronounced below the intensity peak than above. The observed dark areas in OH emission can be produced by gravity waves with vertical wave length small compared with the half width of the intensity profile. (Author)

AD-A083 029/9 PC **A02**/MF **A01**
Stanford Univ CA Inst for Plasma Research
Geomagnetic Activity and Hale Sector Boundaries.
Technical rept.,
Henrik Lundstedt, P. H. Scherrer, and J. M. Wilcox. Feb 80, 20p Rept no. SU-IPR-801
Contracts N00014-76-C-0207, NAS5-24420
Sponsored in part by Grants NGR-05-020-559 and NSF-ATM77-20580.

The variation of the geomagnetic activity index Ap at the Interplanetary Magnetic Field (IMF) sector boundaries (+ to - and - to +) has been studied for three solar cycles, separating data into vernal and autumnal equinoxes. It was found that a reported increase in Ap as an effect of a Hale boundary can be better attributed to the occurrence of a negative IMF Bz component in the geocentric solar magnetospheric coordinate system and to the occurrence of high speed solar wind streams.

AD-A083 038/0 PC **A04**/MF **A01**
Utah State Univ Logan Center for Atmospheric and Space Sciences
Energy Input to the Auroral Ionosphere.
Final rept. 1 Sep 77-31 Aug 78,
J. R. Doupnik. 29 Feb 80, 68p AFOSR-TR-80-0261
Grant AFOSR-77-3435

This effort was to aid studies of the high latitude ionosphere particularly with regard to Joule heating processes. For energy input to the atmosphere by Joule heating the dominant physical factor has been found to be the strength of the electric field - the motions of the ionospheric plasma through the nearly stationary neutral gas. Both the conductivity and electric field change by large factors but the dependence of the Joule heating rate on the square of the electric field strength makes the electric field the most critical factor. In the design of the experiments with a steerable dish antenna the conductivities are obtained from electron densities in the E region of the ionosphere while the electric fields are obtained from the F region. In this work, to cover a wide range of latitudes with acceptable time resolution, the E region measurements were curtailed. A suggestion from model studies is that the offset of the geomagnetic pole from the geographic pole and a further offset of the center of the oval to be several degrees antisunward of the geomagnetic pole introduces a strong longitudinal variation in the magnetic latitude of the oval. So, some longitude sectors, such as Chatanika, penetrate more deeply into the oval than other locations with the same magnetic latitude.

LA-UR-80-17 PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
Application of the Adjoint Method in Atmospheric Radiative Transfer Calculations.
S. A. W. Gerstl. 1979, 20p CONF-791162-1
Contract W-7405-ENG-36
Workshop on atmospheric aerosols: their formation, optical properties and effects, Baltimore, MD, USA, 6 Nov 1979.

The transfer of solar radiation through a standard mid-latitude summer atmosphere including different amounts of aerosols (from clear to hazy) has been computed. The discrete-ordinates (S/sub N/) method, which has been developed to a high degree of computational efficiency and accuracy primarily for nuclear radiation shielding applications, is employed in a forward as well as adjoint mode. In the adjoint mode the result of a transfer calculation is an importance function (adjoint inten-

sity) which allows the calculation of transmitted fluxes, or other radiative responses, for any arbitrary source distribution. The theory of the adjoint method is outlined in detail and physical interpretations are developed for the adjoint intensity. If, for example, the downward directed solar flux at ground level, F/sub lambda/ (z = 0), is desired for N different solar zenith angles, a regular (forward) radiative transfer calculation must be repeated for each solar zenith angle. In contrast, only 1 adjoint transfer calculation gives F/sub lambda/ (z = 0) for all solar zenith angles in a hazy aerosol atmosphere, for 1 wavelength interval, in 2.3 seconds on a CDC-7600 computer. A total of 155 altitude zones were employed between 0 and 70 km, and the convergence criterion for the ratio of fluxes from successive iterations was set at 2 x 10 exp -3 . Our results demonstrate not only the applicability of the highly efficient modern S/sub N/ codes, but indicate also conceptual and computational advantages when the adjoint formulation of the radiative transfer equation is used. (ERA citation 05:013232)

N80-20986/9 PC **A02**/MF **A01**
National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
Simulation Study of a Geometric Shape Factor Technique for Estimating Earth-Emitted Radiant Flux Densities from Wide-Field-of-View Radiation Measurements.
W. L. Weaver, and R. N. Green. Apr 80, 29p NASA-TP-1629, L-13373

Geometric shape factors were computed and applied to satellite simulated irradiance measurements to estimate Earth emitted flux densities for global and zonal scales and for areas smaller than the detector field of view (FOV). Wide field of view flat plate detectors were emphasized, but spherical detectors were also studied. The radiation field was modeled after data from the Nimbus 2 and 3 satellites. At a satellite altitude of 600 km, zonal estimates were in error 1.0 to 1.2 percent and global estimates were in error less than 0.2 percent. Estimates with unrestricted field of view (UFOV) detectors were about the same for Lambertian and limb darkening radiation models. The opposite was found for restricted field of view detectors. The UFOV detectors are found to be poor estimators of flux density from the total FOV and are shown to be much better as estimators of flux density from a circle centered at the FOV with an area significantly smaller than that for the total FOV.

N80-21044/6 PC **A03**/MF **A01**
Systems and Applied Sciences Corp., Riverdale, MD.
Adaptation and Optimization of a Line-by-Line Radiative Transfer Program for the STAR-100 (Starsmart).
P. L. Rarig. Mar 80, 34p NASA-CR-159238
Contract NAS1-15481

A program to calculate upwelling infrared radiation was modified to operate efficiently on the STAR-100. The modified software processes specific test cases significantly faster than the initial STAR-100 code. For example, a midlatitude summer atmospheric model is executed in less than 2% of the time originally required on the STAR-100. Furthermore, the optimized program performs extra operations to save the calculated absorption coefficients. Some of the advantages and pitfalls of virtual memory and vector processing are discussed along with strategies used to avoid loss of accuracy and computing power. Results from the vectorized code, in terms of speed, cost, and relative error with respect to serial code solutions are encouraging.

N80-21223/6 PC **A12**/MF **A01**
Max-Planck-Inst. fuer Physik und Astrophysik, Garching (Germany, F.R.). Inst. fuer Extraterrestrische Physik.
Research Activities of the Institute for Extraterrestrial Physics Taetigkeitsbericht 1978.
Annual Report, 1978.
Jan 79, 258p MPI-PAE/EXTRATERR-150, ISSN-034-8922
Text in German. Original Contains Color Illustrations.

In situ plasma measurements in the vicinity of the Earth were taken. Experiments in the fields of infrared, X-ray, and gamma ray astronomy, and cosmic ray research are described. Progress in spectroscopic techniques, nonlinear optics, and laser spectroscopy is noted.

N80-21239/2 PC **A02**/MF **A01**
Stanford Univ., CA. Inst. for Plasma Research.
On the Nature of the Apparent Response of Vorticity Area Index to the Solar Magnetic Field.
J. M. Wilcox, and P. H. Scherrer. Mar 80, 23p
NASA-CR-162915, SU-SUIPR-802
Contracts NGR-05-020-559, N00014-76-C-0207

The characteristics of tropospheric circulation that are involved in the apparent response of the vorticity area index (VIA) as the solar magnetic field is carried past the Earth by the solar wind are discussed. It is shown that the response is concentrated in the tropospheric regions of most intense circulation, i.e. the central portions of well-formed low pressure troughs. Factors that must be considered when assessing the Sun-weather effect in the years from 1947 to 1978 are included.

PB80-169675 PC **A10**/MF **A01**
SRI International, Menlo Park, CA.
Computer Modeling of Simulated Photochemical Smog.
Final rept. Sep 77-Aug 79,
D. G. Hendry, A. C. Baldwin, and D. M. Golden. Feb 80, 222p EPA-600/3-80-029
Contract EPA-68-02-2427
See also report dated Jun 78, PB-284 025.

Efforts to develop chemical kinetic mechanisms to describe the formation of photochemical smog are discussed. Detailed mechanisms for the atmospheric reactions of toluene, m-xylene, propene, ethene, formaldehyde and acetaldehyde were constructed from available experimental and chemical kinetic data. These mechanisms were used to simulate smog chamber data from the Statewide Air Pollution Research Center at the University of California, Riverside and the outdoor facility of the University of North Carolina.

PB80-170160 CP **T04**
Shell Development Co., Houston, TX.
MULTIMAX: An Air Dispersion Modeling Program for Multiple Sources, Receptors, and Concentrations.
Model-Simulation,
J. H. Moser. Dec 77, mag tape NTIS/DF-80/003
Source tape is in EBCDIC character set. Tapes can be prepared in most standard 7 or 9 track recording modes for one-half inch tape. Identify recording mode desired by specifying character set, track, density, and parity. Call NTIS Computer Products if you have questions. Price includes documentation, PB80-170178.

MULTIMAX is an air dispersion modeling program developed for the estimation of 1-, 3-, 24-hour and annual pollutant concentration averages from the multiple stock sources for multiple receptors. The modeling basis is the Gaussian plume model with Briggs plume rise formulas applied to each of all possible source-receptor pairs for meteorological conditions assumed constant for one hour. Computing options include adjustment of the wind speed for stack height, adjustment of the concentrations from the ten minute sampling basis to one hour, adjusting the results by means of a linear calibration equation and several methods for estimating the effects of elevated terrain. Primary program output consists of the following types of maximum concentration averages for each receptor; annual, highest 3-hour, second highest 3-hour, highest 24-hour, second highest 24-hour, and hourly. Two implementations of the model are available; one for IBM computers and the other for Univac 1100-series computers. The documentation describes the machine-dependent features of the codes.

PB80-170178 PC **A09**/MF **A01**
Shell Development Co., Houston, TX.
MULTIMAX: An Air Dispersion Modeling Program for Multiple Sources, Receptors, and Concentration Averages.
Final rept.,
J. H. Moser. Aug 79, 197p NTIS/DF-80/003A
For system on magnetic tape, see PB80-170160.

Since this manual was originally published in December of 1977, a number of developments have taken place which warrant a complete update. The original computer program was developed on a Univac 1110 computer; a number of machine-dependent features of the software were utilized in order to attain maximum flexibility of the program from a user's standpoint. In 1978, the Tennessee Valley Authority modified the Univac 1110 version of MULTIMAX so that it would run on IBM 360/370 computers. The major additions to this User's Manual are Appendices which discuss input formats for the IBM program version, certain machine-dependent features of the programs and show example inputs and outputs for the Univac and the IBM versions.

PB80-174964 PC **A05**/MF **A01**
Dames and Moore, Bethesda, MD.
Summary Report of the NCAQ Atmospheric Dispersion Modeling Panel. Volume 1. Recommendations.
Final rept.,
M. W. Chandler, J. Lewis, B. Zalcman, J. I. Kelly, and A. E. Nugent. Mar 80, 87p AQ-7379-1
Contract 5-AQ-7379
See also Volume 2, PB80-174873. Panel Meeting Held in Reston, Virginia, November 13-16, 1979.

This is volume 1 of a two-volume report of an Atmospheric Dispersion Modeling Panel convened by the National Commission on Air Quality to provide guidance on: (1) uses and limitations of currently available models for air quality management and (2) appropriate dispersion models and/or technical approaches to be considered in the Commission's evaluation of the Clean Air Act through five comprehensive regional studies (Los Angeles area, Four Corners area, Minneapolis/St. Paul, New York/Hartford, and the Ohio River Valley from Louisville to Cincinnati). Volume 1 contains Panel statements and recommendations and summaries of Panel deliberations.

PNL-SA-7549 PC **A02**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Terrain Effects on Atmospheric Transport and Dispersion: A Status Report.
M. M. Orgill. 1979, 22p CONF-790777-1
Contract EY-76-C-06-1830
International conference on wind engineering, Fort Collins, CO, USA, 8 Jul 1979.

Future air quality assessment methods need accurate information for describing atmospheric transport and dispersion in complex landforms. A status report is given of the problem of transport and dispersion in complex terrain and evaluates the research methods and needs that are required for realistic solutions to the problem. A current multilaboratory complex terrain study at the Geysers geothermal resource area is developing methods and models to address the many aspects of dispersion in complex landforms. Initial results from this study are presented and discussed. (ERA citation 05:014190)

SERI/TR-335-344 PC **A04**/MF **A01**
Solar Energy Research Inst., Golden, CO.
Direct Insolation Models.
R. Bird, and R. L. Hulstrom. Jan 80, 58p
Contract EG-77-C-01-4042

Several recently published models of the direct component of the broadband insolation are compared for clear sky conditions. The comparison includes seven simple models and one rigorous model that is used as a basis for determining accuracy. Where possible, the comparison is made between the results of each model for each atmospheric constituent (H sub 2 O, CO sub 2 , O sub 3 , O sub 2 , aerosol and molecular scattering) separately as well as for the combined effect of all of the constituents. Two optimum simple models of varying degrees of complexity are developed as a result of this comparison. The study indicates: aerosols dominate the attenuation of the direct beam for reasonable atmospheric conditions; molecular scattering is next in importance; water vapor is an important absorber; and carbon dioxide and oxygen are relatively unimportant as attenuators of the broadband solar energy. (ERA citation 05:013234)

SERI/TR-8150-1 PC **A05**/MF **A01**
Atlas Corp., Santa Cruz, CA.

Evaluation of the Typical Meteorological Years for Solar Heating and Cooling System Studies. Final Report.
T. L. Freeman. Dec 79, 77p
Contract EG-77-C-01-4042

This report is a summary of an evaluation of the weather data set, generated at Sandia Laboratories, known as the Typical Meteorological Year (TMY) Data. The purpose of the evaluation is to determine how well the TMY data represent actual long-term weather data in affecting the performance of solar heating and cooling systems. The two data sets are compared through detailed SHAC simulation. (ERA citation 05:013235)

TRITA-EPP-79-03 PC **A02**/MF **A01**
Royal Inst. of Tech., Stockholm (Sweden). Institutionen foer Plasmafysik.
Electric Fields in the Outer Magnetosphere - Recent Progress and Outstanding Problems.
C. -G. Faelthammar. Mar 79, 6p
U.S. Sales Only.

The electric field is a crucial parameter in theories of solar wind interaction with the magnetosphere. During the IMS this parameter has, for the first time, been directly measured in the interacting regions: outer magnetosphere, magnetopause, magnetosheath, bow shock and the adjacent solar wind. Among the first results are the verification of a large-scale dawn-to-dusk tangential electric field component at the magnetopause of typically 1 - 2 mV/m and a corresponding power dissipation of 50 Wkm exp -2 . The normal component of the electric field is typically of the same order of magnitude as the tangential component. Fine-structure features, possibly related to the entry of plasma, remain to be analyzed. (Atomindex citation 10:478241)

4B. Meteorology

AD-A082 445/8 MF **A01**
Army Electronics Research and Development Command White Sands Missile Range NM Atmospheric Sciences Lab
19701A GSRS Missile Number 211, Round Number B-57.
Meteorological data rept.
Nov 79, 25p Rept no. ERADCOM/ASL-DR-1093
Availability: Microfiche copies only.

Meteorological data gathered for the launching of the 19701A GSRS, Missile Number 211, Round Number B-57 are presented in tabular form. (Author)

AD-A082 446/6 MF **A01**
Army Electronics Research and Development Command White Sands Missile Range NM Atmospheric Sciences Lab
12822A Lance Missile Number 4883, Round Number 338-NCL.
Meteorological data rept.
Nov 79, 22p Rept no. ERADCOM/ASL-DR-1090
Availability: Microfiche copies only.

Meteorological data gathered for the launching of the 12822A Lance, Missile Number 4883, Round Number 338-NCL are presented in tabular form. (Author)

AD-A082 447/4 PC **A02**/MF **A01**
Army Electronics Research and Development Command White Sands Missile Range NM Atmospheric Sciences Lab
19304 MLRS Missile Numbers 1085, 1087, 1088, 1089, 1090, 1092, Round Numbers V-83 thru V-88.
Meteorological data rept.
Nov 79, 19p Rept no. ERADCOM/ASL-DR-1092

Meteorological data gathered for the launching of the 19304B RS, Missile Numbers 1085, 1087, 1088, 1089, 1090, 1092, Round Numbers V-83 thru V-88 are presented in tabular form. (Author)

AD-A082 549/7 PC **A05**/MF **A01**
Institute for Storm Research Houston TX
The Development of Methods of Numerical Diagnostic Analysis of Series of Satellite Photographs.
Final rept. Nov 76-Feb 80,
John C. Freeman. 28 Feb 80, 80p ISR-6-13, ARO-13734.4-GS
Grant DAAG29-77-G-0013

A research study to develop methods of predicting mesoscale wind and temperature fields is reported on. Two mesoscale weather patterns were studied by an adaptation of optimization principles. Hourly surface pressure and infrared satellite cloud measurements were used as input to the updating scheme. The results shown here illustrate mesoscale properties of the circulation and vertical temperature distribution. (Author)

AD-A082 553/9 MF **A01**
Army Electronics Research and Development Command Wsmr Nm Atmospheric Sciences Lab
19701B MLRS, Missile Number 066, Round Number B-59.
Meteorological data rept.
Dec 79, 15p Rept no. ERADCOM/ASL-DR-1103
Availability: Microfiche copies only.

Meteorological data gathered for the launching of the 19701B MLRS, Missile Number 066, Round Number B-59 are presented in tabular form. (Author)

AD-A082 554/7 MF **A01**
Army Electronics Research and Development Command White Sands Missile Range NM Atmospheric Sciences Lab
19304A GSRS, Missile Numbers 1072 and 1124, Round Numbers V-94 and V-95.
Meteorological data rept.
7 Dec 79, 14p Rept no. ERADCOM/ASL-DR-1100
Availability: Microfiche copies only.

Meteorological data gathered for the launching of the 19304A GSRS, Missile Number 1072 and 1124, Round Number V-94 and V-95 are presented in tabular form. (Author)

AD-A082 555/4 MF **A01**
Army Electronics Research and Development Command White Sands Missile Range NM Atmospheric Sciences Lab
19304B GSRS, Missile Number 1081, Round Number V-93, 7 December 1979.
Meteorological data rept.
Dec 79, 15p Rept no. ERADCOM/ASL-DR-1099
Availability: Microfiche copies only.

Meteorological data gathered for the launching of the 19304B GSRS, Missile Number 1081, Round Number V-93 are presented in tabular form. (Author)

AD-A082 556/2 MF **A01**
Army Electronics Research and Development Command White Sands Missile Range NM Atmospheric Sciences Lab
19304B GSRS, Missile Number 1080, Round Number V-92, 6 December 1979.
Meteorological data rept.
Dec 79, 17p Rept no. ERADCOM/ASL-DR-1098
Availability: Microfiche copies only.

Meteorological data gathered for the launching of the 19304B GSRS, Missile Number 1080, Round Number V-92 are presented in tabular form. (Author)

AD-A082 557/0 MF **A01**
Army Electronics Research and Development Command White Sands Missile Range NM Atmospheric Sciences Lab
19304B GSRS, Missile Numbers 1069 and 1123, Round Numbers V-90 and V-91, 6 December 1979.
Meteorological data rept.
Dec 79, 17p Rept no. ERADCOM/ASL-DR-1097
Availability: Microfiche copies only.

Meteorological data gathered for the launching of the 19304B GSRS, Missile Numbers 1069, 1123, Round Numbers V-90 and V-91 are presented in tabular form. (Author)

AD-A082 558/8 MF **A01**
Army Electronics Research and Development Command White Sands Missile Range NM Atmospheric Sciences Lab
12828F Lance, Missile Number 2491, Round Number 339-DSL, 5 December 1979.
Meteorological data rept.
Dec 79, 22p Rept no. ERADCOM/ASL-DR-1096
Availability: Microfiche copies only.

No abstract available.

AD-A082 559/6 MF **A01**
Army Electronics Research and Development Command White Sands Missile Range NM Atmospheric Sciences Lab
19304D GSRS, Missile Number 1097, Round Number V-89, 19 November 1979.
Meteorological data rept.
Nov 79, 21p Rept no. ERADCOM/ASL-DR-1095
Availability: Microfiche copies only.

No abstract available.

AD-A082 560/4 MF **A01**
Army Electronics Research and Development Command White Sands Missile Range NM Atmospheric Sciences Lab
19307B GSRS, Missile Numbers 1059 and 1093, Round Numbers V-79 and V-80, 2 November 1979.
Meteorological data rept.
Nov 79, 15p Rept no. ERADCOM/ASL-DR-1088
Availability: Microfiche copies only.

No abstract available.

AD-A082 561/2 MF **A01**
Army Electronics Research and Development Command White Sands Missile Range NM Atmospheric Sciences Lab
19702A GSRS, Missile Numbers 314, 213, Round Numbers b-55, B-56, 30 October 1979.
Meteorological data rept.
Oct 79, 20p Rept no. ERADCOM/ASL-DR-1087
Availability: Microfiche copies only.

No abstract available.

AD-A082 562/0 MF **A01**
Army Electronics Research and Development Command White Sands Missile Range NM Atmospheric Sciences Lab
19702A GSRS, Missile Number 222, Round Number B-58, 19 November 1979.
Meteorological data rept.
Nov 79, 20p Rept no. ERADCOM/ASL-DR-1094
Availability: Microfiche copies only.

No abstract available.

AD-A082 563/8 PC **A02**/MF **A01**
Army Electronics Research and Development Command White Sands Missile Range NM Atmospheric Sciences Lab
12819A Lance, Missile Number 3357, Round Number 340-ECL, 3 January 1980.
Meteorological data rept.
Jan 80, 21p Rept no. ERADCOM/ASL-DR-1108

No abstract available.

AD-A082 565/3 MF **A01**
Army Electronics Research and Development Command White Sands Missile Range NM Atmospheric Sciences Lab
19304D GSRS, Missile Numbers 1129 and 1082, Round Numbers V-81 and V-82, 6 November 1979.
Meteorological data rept.
Nov 79, 15p Rept no. ERADCOM/ASL-DR-1089
Availability: Microfiche copies only.

No abstract available.

AD-A082 566/1 MF **A01**
Army Electronics Research and Development Command White Sands Missile Range NM Atmospheric Sciences Lab
19901A Honest John, Missile Number 2042, Round Number 664 AML, 14 November 1979.
meteorological data rept.
Nov 79, 14p Rept no. ERADCOM/ASL-DR-1091
Availability: Microfiche copies only.

No abstract available.

AD-A082 597/6 PC **A02**/MF **A01**
Louisiana State Univ Baton Rouge Coastal Studies Inst

Mesoscale Nocturnal Jetlike Winds within the Planetary Boundary Layer over a Flat, Open Coast.
Technical rept.,
S. A. Hsu. 31 Jul 79, 13p Rept no. TR-297
Contract N00014-75-C-0192
Pub. in Boundary-Layer Meteorology, v17 p485-494 1979.

No abstract available.

AD-A082 701/4 Not available NTIS
Defence and Civil Inst of Environmental Medicine Downsview (Ontario)
The Transistor as an Anemometer,
L. E. MacHattie. 29 Aug 78, 7p Rept no. DCIEM-PUB-78X26
Availability: Pub. in Jnl. of Physics E: Scientific Instruments, v12 p754-760 1979 (No copies furnished by DTIC).

No abstract available.

AD-A082 755/0 PC **A10/MF A01**
Range Commanders Council White Sands Missile Range NM Meteorological Group
Range Atmospheric and Oceanic Environmental Support Capabilities/Requirements/Procurements.
1980, 222p Rept no. RCC/MG-125-80
Supersedes Rept. no. MG-125-72, AD-782 689.

Discussed are range natural atmospheric and oceanic environmental support capabilities/requirements, which must be known both to satisfy present needs and for long-range planning to meet projected needs. The identification of planned procurements, and equipment excess to requirements, will foster exchanges, transfers, joint procurements, and the cost savings to all member ranges. This document represents a current identification of those capabilities/requirements/procurements. It supersedes IRIG Document 125-72 which is obsolete and should be destroyed.

AD-A082 915/0 Not available NTIS
Universidad Nacional Autonoma de Mexico Mexico City Inst de Geofisica
Do Recent Climatic Fluctuations Portend an Imminent Ice Age. Climate Models and Variations in the Solar Constant. Sidereal Cosmic Ray Variation and its Relation with the Interplanetary Magnetic Field Polarity. Radiometric Determination of Uranium, Thorium and Potassium in Some Rocks of the Guanajuato Mineral District, Mexico,
Hurd C. Willett, William D. Sellers, Javier A. Otaola, Surendra Pal, and David J. Terrell. 1974, 74p
Abstracts in Spanish.
Availability: Pub. in Geofisica International, v14 n4 p265-329 Oct 74 (No copies furnished by DTIC).

No abstract available.

AD-A082 967/1 MF **A01**
Army Electronics Research and Development Command White Sands Missile Range NM Atmospheric Sciences Lab
19308B MLRS, Missile Number 1091, Round Number V-96, 8 December 1979.
Meteorological data rept.
Dec 79, 15p Rept no. ERADCOM/ASL-DR-1101
Availability: Microfiche copies only.

Meteorological data gathered for the launching of the 19308B MLRS, Missile Number 1091, Round Number V-96 are presented in tabular form. (Author)

AD-A082 968/9 MF **A01**
Army Electronics Research and Development Command White Sands Missile Range NM Atmospheric Sciences Lab
19308B MLRS, Missile Number 1057, Round Number V-97, 8 December 1979.
Meteorological data rept.
8 Dec 79, 15p Rept no. ERADCOM/ASL-DR-1102
Availability: Microfiche copies only.

Meteorological data gathered for the launching of the 19308B MLRS, Missile Number 1057, Round Number V-97 are presented in tabular form. (Author)

AD-A082 969/7 MF **A01**
Army Electronics Research and Development Command White Sands Missile Range NM Atmospheric Sciences Lab
19308B MLRS, Missile Number 1125, Round Number V-98, 11 December 1979.
Dec 79, 15p Rept no. ERADCOM/ASL-DR-1104
Original contains color plates: All DTIC and NTIS reproductions will be in black and white.
Availability: Microfiche copies only.

Meteorological data gathered for the launching of 19308B MLRS, Missile Number 1125, Round Number V-98 are presented in tabular form. (Author)

AD-A082 970/5 MF **A01**
Army Electronics Research and Development Command White Sands Missile Range NM Atmospheric Sciences Lab
19701BT MLRS, Missile Number 026 and 025, Round Number B-60 and B-61, 18 December 79.
Dec 79, 21p Rept no. ERADCOM/ASL-DR-1106
Availability: Microfiche copies only.

Meteorological data gathered for the launching of the 19701Bt MLRS, Missile Numbers 026 and 025, Round Numbers B-60 and B-61 are presented in tabular form. (Author)

AD-A082 971/3 MF **A01**
Army Electronics Research and Development Command White Sands Missile Range NM Atmospheric Sciences Lab
19304D MLRS, Missile Number 1130, Round Number V-99, 18 December 79.
Dec 79, 18p Rept no. ERADCOM/ASL-DR-1107
Availability: Microfiche copies only.

Meteorological data gathered for the launching of the 19304D MLRS, Missile Number 1130, Round Number V-99 are presented in tabular form.

AD-A082 972/1 MF **A01**
Army Electronics Research and Development Command White Sands Missile Range NM Atmospheric Sciences Lab
19702B MLRS, Missile Numbers 028, 005, 353, 027, 351, 352, Round Numbers B-62, B-63, B-64, B-65, B-66, B-67, 5 January 1980.
Jan 80, 19p Rept no. ERADCOM/ASL-DR-1109
Availability: Microfiche copies only.

Meteorological data gathered for the launching of 19702B MLRS, Missile Numbers 028, 005, 353, 027, 351 and 352, Round Numbers B-62, B-63, B-64, B-65, B-66 and B-67 are presented in tabular form.

AD-A082 973/9 PC **A02/MF A01**
Army Electronics Research and Development Command White Sands Missile Range NM Atmospheric Sciences Lab
19701A MLRS, Missile Numbers 068, 024, Round Numbers B-68, B-69, 5 January 1980.
Jan 80, 18p Rept no. ERADCOM/ASL-DR-1110

Meteorological data gathered for the launching of 19701A MLRS, Missile Numbers 068, 024, Round Numbers B-68, B-69 are presented in tabular form. (Author)

AD-A082 974/7 PC **A02/MF A01**
Army Electronics Research and Development Command White Sands Missile Range NM Atmospheric Sciences Lab
19704A MLRS, Missile Number 067, Round Number B-71, 7 January 80.
Jan 80, 14p Rept no. ERADCOM/ASL-DR-1112

Meteorological data gathered for the launching of 19704A MLRS, Missile Number 067, Round Number B-71 are presented in tabular form.

AD-A082 975/4 MF **A01**
Army Electronics Research and Development Command White Sands Missile Range NM Atmospheric Sciences Lab
19304B MLRS, Missile Number 1134, Round Number V-100, 8 January 1980.
Jan 80, 17p Rept no. ERADCOM/ASL-DR-1113
Availability: Microfiche copies only.

Meteorological data gathered for the launching of 19304B MLRS, Missile Number 1134, Round Number V-100 are presented in tabular form. (Author)

AD-A082 976/2 MF **A01**
Army Electronics Research and Development Command White Sands Missile Range NM Atmospheric Sciences Lab
19705B MLRS, Missile Numbers 331, 196, Round Numbers B-72, B-73, 11 January 1980.
Jan 80, 18p Rept no. ERADCOM/ASL-DR-1114
Availability: Microfiche copies only.

Meteorological data gathered for the launching of 19705B MLRS, Missile Numbers 331, 196, Round Numbers B-72, B-73, are presented in tabular form. (Author)

AD-A082 977/0 MF **A01**
Army Electronics Research and Development Command White Sands Missile Range NM Atmospheric Sciences Lab
19306B MLRS, Missile Numbers 1058-1099, Round Numbers V-101 - V-102, 14 January 80.
14 Jan 80, 17p Rept no. ERADCOM/ASL-DR-1115
Availability: Microfiche copies only.

Meteorological data gathered for the launching of the 19306B MLRS, Missile Numbers 1058 and 1099, Round Numbers V-101 and V-102 are presented in tabular form.

AD-A082 978/8 MF **A01**
Army Electronics Research and Development Command White Sands Missile Range NM Atmospheric Sciences Lab
19304A MLRS, Missile Number 1135, Round Number V-103, 15 January 1980.
Jan 80, 19p Rept no. ERADCOM/ASL-DR-1116
Availability: Microfiche copies only.

Meteorological data gathered for the launching of 19304A MLRS, Missile Number 1135, Round Number V-103 are presented in tabular form. (Author)

AD-A082 979/6 PC **A02/MF A01**
Army Electronics Research and Development Command White Sands Missile Range NM Atmospheric Sciences Lab
19701B MLSR, Missile Number 214, Round Number B-74, 18 January 1980.
Jan 80, 16p Rept no. ERADCOM/ASL-DR-1117

Meteorological data gathered for the launching of 19701B MLRS, Missile Number 214, Round Number B-74 are presented in tabular form. (Author)

AD-A082 980/4 MF **A01**
Army Electronics Research and Development Command White Sands Missile Range NM Atmospheric Sciences Lab
19305A MLRS, Missile Numbers 1083, 1132, 1141, 1142, 1143, Round Numbers V-104, V-105, V-106, V-107, V-108, 23 January 1980.
Jan 80, 18p Rept no. ERADCOM/ASL-DR-1118
Availability: Microfiche copies only.

Meteorological data gathered for the launching of 19305A MLRS, Missile Numbers 1083, 1132, 1141, 1142, 1143, Round Numbers V-104, V-105, V-106, V-107 and V-108 are presented in tabular form. (Author)

AD-A082 981/2 MF **A01**
Army Electronics Research and Development Command White Sands Missile Range NM Atmospheric Sciences Lab
19306B MLRS, Missile Numbers 1107, 1104, 1106, Round Numbers V-125, V-126, V-127, 19 February 1980.
Meteorological data rept.
Feb 80, 17p Rept no. ERADCOM/ASL-DR-1139
Availability: Microfiche copies only.

Meteorological data gathered for the launching of 19306B MLRS, Missile Numbers 1107, 1104, 1106, Round Numbers V-125, V1-26 and V-27 are presented in tabular form. (Author)

AD-A083 024/0 PC **A04/MF A01**
Chicago Univ IL Dept of Geophysical Sciences

A Quasi-One-Dimensional Cumulus Cloud Model and Parameterization of Cumulus Heating and Mixing Effects.
Final rept. Nov 76-Sep 79,
H. L. Kuo, and W. H. Raymond. Nov 79, 69p
AFGL-TR-79-0272
Contract F19628-77-C-0044

The characteristics properties of cumulus convection are investigated using a semi-one-dimensional axisymmetric quasi-Lagrangian steady state model which takes into consideration the influences of the pressure perturbation, density stratification and nearby moist downdraft under two different environmental situations, namely, 1) a potentially more unstable tropical environment and 2) a less unstable middle latitude environment with prominent stable layers in middle troposphere. It is found that the compressional heating of the dry environment makes the cloud air warmer and reduces the updraft velocity slightly and moist downdraft cools the cloud air and reduces both the updraft and the cloud depth, while the influence of pressure perturbation is also to reduce the updraft but it is effective only for clouds of radii larger than 1000 m. The influence of density stratification is to reduce w sub c slightly at low levels and augment w sub c at high levels and to slightly increase the cloud depth. The calculated precipitation rates appear to be close to the representative values obtained from observations. One most interesting result given by the model is that, under the less unstable middle latitude environment, the precipitation rate jumps from lower than .7 cm/hr for cloud radii smaller than 1000 m to more than 5.4 cm/hr for cloud radii greater than 2000 m, reflecting the inhibiting effect of the mid-troposheric stable layer on the penetrative power of the smaller clouds.

PB80-166994 PC **A07**/MF **A01**
Military Academy, West Point, NY. Science Research Lab.
Chemistry of Precipitation from Sequentially Sampled Storms.
Final rept. Oct 76-Sep 78,
J. K. Robertson, T. W. Dolzine, and R. C. Graham. Jan 80, 129p EPA-600/4-80-004

Sequential sampling techniques and applications to collect precipitation are reviewed. Chemical data for samples collected by an intensity-weighted sequential sampling device in operation at the U.S. Military Academy, West Point, New York from October 1976 to April 1978 are presented and discussed. The problem of dry deposition is explored. A newly designed intensity-weighted sequential sampler that excludes dry deposition is presented. The experiments have shown that intensity-weighted sequential sampling is a viable technique for monitoring the rapid changes in precipitation chemistry within a storm. Complete chemical data are needed from individual storms to evaluate intensity related scavenging.

PB80-168883 Not available NTIS
Washington Univ., Seattle.
Ocean-Atmosphere Interaction in High Southern Latitudes,
D. James Baker, Jr. c1979, 16p NSF/IDOE-80-1
Grant NSF-OCE76-83904
Pub. in Dynamics of Atmospheres and Oceans, v3 p213-229, 1979.

Studies of existing data and numerical models of processes in the high latitudes of the southern hemisphere are few although the data base is expanding. The position of ocean-surface temperature gradients and the tracks of developing vortices and sea-level pressure patterns seem to be correlated, but it is not clear what drives what. Cyclogenesis appears to occur equatorward of surface gradients, but the reason is not clear. Strong semiannual and weaker biennial oscillations are present in much of the data. Eddy heat-flux estimates are the correct order of magnitude for these latitudes for global heat balance. The results of such studies provide a testing ground for climate models which must include the correct physics of long-period fluctuations.

PB80-168982 PC **E04**/MF **E04**
International Inst. for Applied Systems Analysis, Laxenburg (Austria).
The Smeared Concentration Approximation Method: A Simplified Air Pollution Dispersion Methodology for Regional Analysis.
Final rept.,
R. L. Dennis. cJul 78, 77p RR-78-9

This paper describes a simplified method, the smeared concentration approximation (SCA) method, developed to characterize air pollution dispersion on the local scale. The SCA method is intended for use in models and analysis concerned with long term policy analysis at the regional level. The methodology centers around the development of SCA dispersion parameters for short-range transport (urban scale) for each of three emission classes: low-level area sources, medium-level point sources, and high-level point sources. Development of the SCA dispersion parameters, using detailed air pollution dispersion models, is described. An SCA dispersion kit for each of the three emission classes is given. Validation of the SCA method and examples of its use are discussed. Some typical questions concerning the use of the SCA method are also discussed. In an Appendix, an example is worked through to show how the SCA dispersion kits are used to develop each SCA dispersion parameter.

PB80-169576 PC **A04**/MF **A01**
Environmental Sciences Research Lab., Research Triangle Park, NC.
Dispersion of Sulfur Dioxide from the Clinch River Power Plant, A Wind-Tunnel Study.
Fluid modeling rept. no. 7, Jun 77-Dec 78,
Roger S. Thompson. Sep 79, 75p EPA-600/4-79-052

A wind-tunnel study of the transport and dispersion of sulfur dioxide from the Clinch River Power Plant in Virginia was performed for periods of neutral atmospheric conditions corresponding to two 1-hour periods for which field data were available. A 7-km x 21-km area of the quite rugged complex terrain surrounding the power plant was modeled at a scale of 1:1920 using a terraced construction. Exaggerated stack diameters were used in modeling the buoyant emissions from the plant's two stacks.

PB80-174576 PC **A02**/MF **A01**
National Weather Service, Salt Lake City, UT. Western Region.
Misinterpretations of Precipitation Probability Forecasts.
Technical memo.,
Allan H. Murphy, Sarah Lichtenstein, Baruch Fischhoff, and Robert L. Winkler. Feb 80, 23p
NOAA-TM-NWS-WR-149, NOAA-80030701

Previous studies have suggested that the general public misinterprets probability of precipitation (PoP) forecasts. This paper summarizes a study of 79 residents of Eugene, Oregon who completed a questionnaire designed to investigate their understanding of an attitude toward precipitation probability forecasts. Results indicate that the event in question frequently is misunderstood, with both traditional precipitation forecasts and PoP forecasts experiencing similar levels of event misinterpretation. Moreover, most respondents revealed a preference for the use of probabilities to express the uncertainty inherent in precipitation forecasts.

PB80-175250 PC **A03**/MF **A01**
National Research Council, Washington, DC. Climate Research Board.
Carbon Dioxide and Climate: A Scientific Assessment.
Jul 79, 35p
Sponsored in part by Office of Science and Technology Policy, Washington, DC.

Atmospheric concentrations of carbon dioxide are steadily increasing, and these changes are linked with man's use of fossil fuels and exploitation of the land. Since carbon dioxide plays a significant role in the heat budget of the atmosphere, it is reasonable to suppose that continued increases would affect climate. These concerns have prompted a number of investigations of the implications of increasing carbon dioxide. Their consensus has been that increasing carbon dioxide will lead to a warmer earth with a different distribution of climatic regimes. In view of the implications of this issue for national and international policy planning, the Office of Science and Technology Policy requested the National Academy of Sciences to undertake an independent critical assessment of the scientific basis of these studies and the degree of certainty that could be attached to their results.

PB80-175821 PC **A07**/MF **A01**
Department of Commerce, Washington, DC. Weather Modification Advisory Board.
National Weather Modification Policies and Programs. A Report to the President and the Congress.
Nov 79, 150p NOAA-80022011
See also Volume 1, PB-289 188.

The National Weather Modification Policy Act of 1976 (P.L. 94-490), reproduced as appendix A to this report (the 'Act'), directed the Secretary of Commerce to conduct a comprehensive study of the status of weather modification science and technology and to submit to the President and the Congress a report on the findings, conclusions, and recommendations of the study. This is the report prepared pursuant to that Congressional directive. Modification of the weather is scientifically possible. If it is done reliably and with predictable results, society would benefit substantially, both economically and by saving of lives.

PNL-SA-7587 PC **A02**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Lagrangian Similarity Modeling of Vertical Diffusion from a Ground-Level Source.
T. W. Horst. 1979, 17p CONF-790721-3
Contract EY-76-C-06-1830
Symposium on turbulent shear flows, London, UK, 2 Jul 1979.

Several alternate Lagrangian similarity predictions of turbulent diffusion in a thermally-stratified turbulent shear flow were compared with the Prairie Grass ground-level, crosswind-integrated tracer concentration data. The best agreement with the data was found by assuming that the eddy diffusivity K of a passive contaminant corresponds to that of heat, by using an exponent r equal to 1.5 or 2 in the vertical contaminant distribution exp(-(anti z/b anti z)/sup r/), and by using Chaudhry and Meroney's equation-d anti z/dx = K(anti z)/anti zu (c anti z) for the downwind growth of the mean height anti z of the diffusing contaminant. (ERA citation 05:014156)

UCRL-52837 PC **A03**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Numerical Wind Field Model Validation for a Complex Terrain Area in the Vicinity of Lawrence Livermore Laboratory.
W. M. Porch, H. Walker, C. R. Veith, and M. H. Dickerson. 20 Sep 79, 35p
Contract W-7405-ENG-48

MATHEW, a mass-consistent wind field model including topography, was tested using statistically selected data stations in the region of Lawrence Livermore Laboratory (LLL). Predicted versus measured winds were compared for data taken across a windy pass (Patterson Pass) in the hills 3 km east of LLL. The topographic scale and the number of selected stations were varied to assess their relative impact on the agreement between the winds predicted by the model and those measured at Patterson Pass. The test results for a one-hour data set show that the model underestimates the measured winds by 25% and the wind energy by a factor of 2.4, with little dependence on topographic scale and some dependence on which data stations were included in the model; however, high winds were predicted in high wind areas. MATHEW's potential as a prognostic model for accurately estimating high wind speeds in complex terrain can be enhanced, if there are improvements in sub-grid placement of data stations, if objective wind field analysis is applied to horizontal interpolation where a time history of the data stations used in the model exists, and if there is further improvement of calculational procedures. (ERA citation 05:012487)

5. BEHAVIORAL AND SOCIAL SCIENCES

5A. Administration and Management

AD-A082 431/8 PC **A15**/MF **A01**
Hughes Aircraft Co Fullerton CA Field Service and Support Div

Operations and Support Cost Characteristics of Testers and Test Subsystems.
Final technical rept.,
D. R. Bogard, T. H. Hsu, R. Kirkpatrick, and J. Pocock. Jan 80, 343p RADC-TR-79-334
Contract F30602-78-C-0150

Fifty-nine operations and support cost estimating relationships (CERs) and 20 guidelines have been developed for use early in the development phase of Air Force electronic equipment programs to estimate the operation and support costs and ramifications associated with various types of testers and test subsystems. These CERs were developed through application of engineered cost estimating and regression analysis techniques utilizing a large sample of historical and experience data. The CERs require little knowledge of the testers or test subsystems in their application. Eighteen CERs require knowledge or estimating/predicting capability of only one independent variable; the remaining 41 require knowledge of only two independent variables. The 95% prediction confidence interval can also be calculated for each CER application. (Author)

AD-A082 492/0 PC **A02**/MF **A01**
Air Force Human Resources Lab Brooks AFB TX
Fiscal Year 1981-Air Force Technical Objective Document.
Technical rept.
Mar 80, 20p Rept no. AFHRL-TR-79-69
Supersedes report dated Dec 79, AD-A080 628.

This document provides the academic and industrial R&D community with a summary of the technical area objectives of Air Force research in the field of human resources. The areas covered are: (a) Personnel and Manpower Management, (b) Education and Training, (c) Personnel Selection and Retention, (d) Force Structure and Utilization, (e) Flying Training Technology, (f) Technical Training Technology, (g) Simulation Technology for Training, and (h) Personnel and Training Factors in Advanced Systems. (Author)

AD-A082 704/8 PC **A04**/MF **A01**
Army Research Inst for the Behavioral and Social Sciences Alexandria VA
Abstracts of ARI Research Publications, FY 1974 and 1975.
Technical rept.
Oct 79, 63p Rept no. ARI-TR-424

Abstracts and bibliographic citations, including DDC accession number, are given for 29 Research Reports, Technical Research Notes, and Technical Papers published by the Army Research Institute (ARI) during fiscal years 1974 and 1975. The technical areas and field units in which the research was done are described briefly. To complete the record of research, abstracts of 32 intra-agency Research Problem Reviews and Research Memorandums are included. Indexes by author and by research area and a list of Federal depository libraries where the published reports may be obtained are given. (Author)

AD-A082 708/9 PC **A07**/MF **A01**
Department of Defense Washington DC
FY 1974 Defense Budget and FY 1974-1978 Program.
Annual rept.
29 Mar 73, 129p
Statement of Secretary of Defense Elliot L. Richardson before the House Armed Services Committee on 10 Apr 73.

Contents: The Secretary's Summary; U.S. National Security Policies and Objectives; The FY 1974 Defense Budget; The FY 1974 Program and Forces; and Manpower.

AD-A082 709/7 PC **A11**/MF **A01**
Department of Defense Washington DC
FY 1975 Defense Budget and FY 1975-1979 Defense Program.
Annual rept.
1975, 243p
Report of the Secretary of Defense James R. Schlesinger to the Congress, 4 Mar 74.

Contents: The International Situation and the Defense Establishment, The Proposed Defense Budget, Strategic Forces--The basis for the strategic forces, Significant developments in the strategic threat, and U.S. strategic forces and programs; General Purpose Forces--The need for general purpose forces, Land forces, Naval forces, Tactical air forces, and Mobility forces; Manpower for Defense--The volunteer force, Manpower utilization and requirements, Personnel policies, and Special problems; and Management--Force aging and modernization, The weapons acquisition process, Support structure, and Energy management and conservation.

AD-A082 710/5 PC **A09**/MF **A01**
Department of Defense Washington DC
FY 1972-1976 Defense Program and the 1972 Defense Budget.
1 Mar 71, 182p
Statement of Secretary of Defense Melvin R. Laird before the House Armed Services Committee on 9 Mar 71.

Partial Contents: Toward a Strategy of Realistic Deterrence--Strategy overview, Concepts for defense planning, Threats to free world security, and Force planning under the new strategy; and Toward Better Management of Human, Material and Economic Resources in the Department of Defense.

AD-A082 748/5 PC **A04**/MF **A01**
Boeing Aerospace Co Seattle WA
Contracting for Software Acquisition. One of the Software Acquisition Engineering Guidebook Series.
Final rept.,
R. B. Doggett. 2 Jan 79, 54p D180-24701-1, ASD-TR-78-50
Contract F33657-76-C-0723

This report is one of a series of guidebooks whose purpose is to assist Air Force Program Office Personnel and other USAF acquisition engineers in the acquisition engineering of software for Automatic Test Equipment and Training Simulators. This guidebook describes the contract acquisition process, including requests for proposal and source selection. It describes types of contracts applicable to Automatic Test Equipment and Training Simulator software. (Author)

AD-A082 772/5 PC **A04**/MF **A01**
Army Research Inst for the Behavioral and Social Sciences Alexandria VA
Abstracts of ARI Research Publications, FY 1976.
Technical rept.
Nov 79, 60p Rept no. ARI-TR-425

Abstracts and bibliographic citations, including the DDC accession number, are given for 30 Research Reports, Technical Papers, Utilization Reports, and Technical Reports published by the Army Research Institute (ARI) during Fiscal Year 1976. To complete the record of research accomplished by ARI in FY 76, abstracts or descriptions are included of 8 research products (e.g., Guidebook for Developing Criterion-Referenced Tests) and of 40 intra-agency Research Problem Reviews, Research Memorandums, and Technical Reports. All items are indexed by author and corporate author and by research area. The Federal depository libraries where the published reports may be obtained are also listed. (Author)

AD-A082 834/3 PC **A02**/MF **A01**
Department of Defense Washington DC
Department of Defense Annual Report Fiscal Year 1979. Executive Summary,
Harold Brown. 2 Feb 78, 15p

The Secretary of Defense concludes that, while there is work ahead, there are no grounds for panic or crash efforts. The world remains turbulent and dangerous; the Soviets, despite all their internal handicaps and external problems, have become a serious military competitor. Certainly we pulled ahead in the late 1950s and early 1960s, and then substantially reduced our basic effort while the Soviets continued to expand theirs at a steady pace. Now we must increase our investment in defense if we are to stay abreast. That we have the basic strength and will for the task cannot be in doubt. That we have the prudence and patience to run at whatever pace the Soviets may choose to set remains to be seen.

AD-A082 836/8 PC **A03**/MF **A01**
Department of Defense Washington DC
Department of Defense Annual Report Fiscal Year 1981. Executive Summary,
Harold Brown. 29 Jan 80, 29p

Partial contents: The FY 1981 Defense Budget; The Soviet Union; International Turbulence; The Strategic Nuclear Problem; The Theater Nuclear Problem; The Non-Nuclear Problem; and The Programs.

AD-A082 837/6 PC **A08**/MF **A01**
Department of Defense Washington DC
Fiscal Year 1971 Defense Program and Budget.
25 Feb 70, 169p
Statement of Secretary of Defense Melvin R. Laird before the House Subcommittee on Department of Defense Appropriations.

Partial contents: Priorities and Resource Allocation; Strategic, General Purpose, and Mobility Forces; Research and Development; Management in the Department of Defense; and Manpower and Human Goals.

AD-A082 838/4 PC **A16**/MF **A01**
Department of Defense Washington DC
FY 1978 Budget, FY 1979 Authorization Request and FY 1978-1982 Defense Programs,
Annual rept.
17 Jan 77, 352p
Report of Secretary of Defense Donald H. Rumsfeld to the Congress. See Also AD-A082 839.

Topics discussed include: Foreign Policy and Force Planning; The Challenges to Security; The Role of the United States; Strategic and Theater Nuclear Forces; Conventional Forces; Security Assistance; Intelligence; Research and Development, Manpower; Management; and The Defense Budget and the Economy.

AD-A082 839/2 PC **A03**/MF **A01**
Department of Defense Washington DC
FY 1978 Budget, FY 1979 Authorization Request and FY 1978-1982 Defense Programs. Executive Summary,
Annual rept.
17 Jan 77, 29p
Report of Secretary of Defense Donald H. Rumsfeld to the Congress. See also AD-A082 838.

Topics include: FY 1978 Defense Report; Foreign Military Capabilities; Challenges to Security; The Role of America and Our Allies in the World; Arms Control and Deterrence; Strategic, and Other Nuclear Concepts and Forces; and Conventional Forces.

AD-A082 840/0 PC **A13**/MF **A01**
Department of Defense Washington DC
FY 1977 Budget and its Implications for the FY 1978 Authorization Request and the FY 1977-1981 Defense Programs.
Annual rept.
27 Jan 76, 292p
Report of Secretary of Defense Donald H. Rumsfeld to the Congress.

Topics include: National Defense and the International Situation; The Defense Budget; Strategic and Theater Nuclear Forces; General Purpose Forces; Other Missions--Intelligence, C3, and Support to Other Nations; Mission Support--Central Supply and Maintenance, Training, Medical and Administrative Activities; Manpower; and Management.

AD-A082 934/1 PC **A10**/MF **A01**
Department of Defense Washington DC
Annual Defense Department Report FY 1973,
22 Feb 72, 203p
Statement of Secretary of Defense Melvin R. Laird before the House Subcommittee on Department of Defense Appropriations on the FY 1973 Defense Budget and FY 1973-1977 Program.

Partial Contents: The Strategy of Realistic Deterrence--Net assessment and the threat, Total force planning to implement the strategy, Theater nuclear and conventional forces for deterrence, and New initiatives and regional considerations in total force planning, Better Management of Defense

Resources--Organization and Management, and Department of Defense manpower objectives; and Defense and the Economy.

AD-A082 951/5 PC **A99**/MF **A01**
Northrop Corp Anaheim CA Electro-Mechanical Div
Development of an Informational Taxonomy of Visual Displays for Army Tactical Data Systems.
Research memo. Dec 72-Dec 73,
Kenneth R. Colson, Forbes S. Freeman, Lemuel P. Mathews, and John A. Stettler. Feb 74, 612p
ARI-RM-74-4
Contract DAHC19-73-C-0028

This report is concerned with the process which occurs between the time a user intuitively senses that a human factors problem exists in military equipment until resolution is obtained. But reaching that point involves many people and agencies (e.g., OCRD, TRADOC-CACDA, PMARTADS, MASSTER, and contractor personnel in this case) as well as considerable work. The authors follow a request for a large screen tactical display for use in command and control systems through the steps which finally result in recommendations for R&D efforts to produce such a display system.

AD-A083 004/2 PC **A05**/MF **A01**
Logistics Management Inst Washington DC
A Concept for the Management of Readiness,
Laurence D. Richards, Peter L. Eirich, and Murray A. Geisler. Jan 80, 97p Rept no. LMI-ML913
Contract MDA903-77-C-0370
Original contains color plates: All DTIC and NTIS reproductions will be in black and white.

The following are among the report's major conclusions for readiness management in DoD: (1) Inconsistency and ambiguity in the use of the word 'readiness' and associated terms can be reduced through promulgation of a readiness taxonomy and list of formal definitions; (2) Coordination of readiness management efforts and of readiness-related resource allocation and policy decisions can be improved through assignment of responsibility for readiness management to specific offices and individuals with top-level visibility; (3) In general, since no single measure of readiness captures the total meaning of the definition of readiness, a combination or vector of measures is required in evaluating readiness-related resource allocation and policy decisions; (4) Models currently used or under development offer great potential for resource allocation decisions; (5) Rigorously designed and analyzed readiness exercises are potentially valuable sources of information for identifying specific readiness deficiencies; and (6) Development of a policy-level decision support system for readiness management requires that information available from the various sources be meticulously structured in terms of force types, weapons systems, and missions; stocks and flows of materiel and personnel; and appropriately aggregated resource categories.

AD-A083 011/7 PC **A05**/MF **A01**
Vector Research Inc Ann Arbor MI
A Framework for Identifying Human Factors Research Needs in Command and Control.
Final rept. 16 Jul 79-23 Jan 80,
Seth Bonder, W. Peter Cherry, and Robert L. Farrell. Mar 80, 82p VRI-ARI-4-FR80-1, ARI-RN-80-5
Contract MDA903-79-C-0324

This effort developed a framework to assist in identifying human factors research areas in command and control (HF/C2) of importance to the Army. It is a systems-oriented framework that considers HF/C2 activities needed to assist in developing Army systems and HF/C2 knowledge required/available to generate a menu of potential HF/C2 research needs by type of research (Application Demonstration, Applied Research, and Exploratory Research). The framework also provides information regarding the time when the research output will be of first use to the Army. (Author)

DOE/CR-0012 PC **A04**/MF **A01**
Department of Energy, Washington, DC.
Budget Brief, 1981.
1980, 74p

The FY DOE budget totals $12.6 billion in budget authority and $11.1 billion in budget outlays. The budget authority being requested consists of $10.3 billion in new authority and a $2.3 billion reappropriation of expiring funds for the Strategic Petroleum Reserve. Areas covered in the Energy budget are: energy conservation; research, development, and applications; regulation and information; direct energy production; strategic energy production; and energy security reserve. Other areas include: general science, defense activities; departmental administration; and legislative proposal - spent fuel. Budget totals are compared for 1980 and 1981. A detailed discussion of the FY 1981 activities to be undertaken to carry out these activities is provided. (ERA citation 05:012002)

LA-UR-80-93 PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
Why a Graduate Center in a National Laboratory.
S. H. Gurbaxani. 1980, 3p CONF-800112-1
Contract W-7405-ENG-36
College industry education conference, Tucson, AZ, USA, 28 Jan 1980.

Advantages of having a graduate center at a national laboratory and some operational aspects of the center are briefly summarized. (ERA citation 05:014581)

N80-21185/7 PC **A14**/MF **A01**
Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (Germany, F.R.).
Planning and Control of Research and Development Projects with Contributions from Space Technology Planung und Ueberwachung von Forschungs- und Entwicklungsprojekten.
B. J. Madauss. Nov 78, 311p
Partly in German and English.

The principal planning and control methods are elaborated to include technical and engineering tasks, financial and personnel management. General rules are given which have come from not only the space program, but from management of such large engineering projects as the Caracas subway system. Annexes contain examples of forms and flow charts used as tools in such projects.

N80-21186/5 PC **A08**/MF **A01**
General Technology Systems Ltd., London (England).
Study and Implementation of an ESA Computerized Planning System, Phase 1. Volume 2: Data Files and Updating.
P. Brunt, G. E. Hall, and L. W. Steines. Jan 78, 173p GTS-760972-V-2, ESA-CR(P)-1222-V-2
Contract ESA-3172/77-F-WMT
6.

A computerized system which simulates the planning activities, formalizes the decision making process, and aids management information retrieval for the European Space Agency is described. It is indicated that the system permits the analysis of statistical cost data; the manipulation of price levels, currencies and cost elements, the prediction of national space expenditure capabilities and of the margin available for new projects, the selection and 'fitting' of projects into the margin, and the comparison of manpower requirements with forecast industrial capacity. Raw data files are provided as well as instructions for updating.

N80-21187/3 PC **A05**/MF **A01**
General Technology Systems Ltd., London (England).
Study and Implementation of an ESA Computerized Planning System, Phase 2. Volume 4: Updating of Subprograms ESA 1-5.
G. E. Hall, L. W. Steines, and P. Brunt. Oct 78, 82p GTS-760972-V-4, ESA-CR(P)-1222-V-4
Contract ESA-3172/77-F-WMY(SC)
6.

A computerized system has been defined and implemented which simulates the planning activities, formalizes the decision making process and aids mangement information retrieval for the European Space Agency. Five subprogram blocks permit the analysis of statistical cost data, the manipulation of price levels, currencies and cost elements, the prediction of national space expenditure capabilities and of the margin available for new projects; the selection and fitting of projects into the margin, and the comparison of manpower requirements with forecast industrial capacity. The detailed activities necessary for updating the planning system subprograms are given.

N80-21188/1 PC **A08**/MF **A01**
General Technology Systems Ltd., London (England).
Study and Implementation of an ESA Computerized Planning System, Phase 2. Volume 5: Project Returns and Benefits.
P. Brunt, G. E. Hall, and W. Spiess. Dec 78, 154p GTS-760972-V-5, ESA-CR(P)-1222-V-5
Contract ESA-3172/77-F-WMT
6.

A computerized system was defined and implemented which simulates the planning activities, formalizes, the decision making process, and aids management information retrieval for the European Space Agency. Five subprogram blocks permit the analysis of statistical cost data; the manipulation of price levels, currencies and cost elements; the prediction of national space expenditure capabilities and of the margin available for new projects; the selection and 'fitting' of projects into the margin; and the comparison of manpower requirements with forecast industrial capacity. The definition and programming of the segment of the program dealing with the evaluation of project returns and benefits are presented. The functions foreseen for the program in use, program structure, coding instructions, and description of subprograms are included.

N80-21189/9 PC **A03**/MF **A01**
General Technology Systems Ltd., London (England).
Study and Implementation of an ESA Computerized Planning System. Executive Summary.
P. Brunt, and G. E. Hall. Oct 78, 32p GTS-760972-V-6, ESA-CR(P)-1222-V-6
Contract ESA-3172/77-F-WMT
6.

A computerized system was defined and implemented which simulates the planning activities, formalizes the decision making process, and aids management information retrieval for the European Space Agency. Subprogram blocks which permit the analysis of statistical cost data, the manipulation of price levels, currencies and cost elements, the prediction of national space expenditure capabilities and of the margin available for new projects, the selection and 'fitting' of projects into the margin, and the comparison of manpower requirements with forecast industrial capability are described. Subprograms which provide the additional capability to evaluate project returns and benefits are also discussed.

PB80-166184 PC **A05**/MF **A01**
Baldwin (Fred D.), Carlisle, PA.
The National Center for Appropriate Technology: An Evaluation at the End of Its Second Program Year,
Fred D. Baldwin, and Laurence F. Kinney. 30 Jun 79, 87p CSA-LN-2414

NCAT's work programs, past and pending, have demanded the accomplishment of extremely ambitious tasks for relatively small amounts of money. During its first year (really its first 18 months), NCAT built up a competent technical staff and launched some promising in-house work, but otherwise largely dissipated its small resources, even after allowance was made for the inevitability of start-up problems. During its second year, however, it has made a remarkable recovery, in part by adopting more conventional priorities and management methods. In several areas, it is still spreading its resources too thinly.

PB80-167273 PC **A04**/MF **A01**
General Accounting Office, Washington, DC. Community and Economic Development Div.
The Coast Guard--Limited Resources Curtail Ability to Meet Responsibilities.
Report to the Chairman, Committee on Commerce, Science, and Transportation United States Senate.

3 Apr 80, 74p CED-80-76

The Coast Guard's responsibilities have increased without a commensurate growth in its resources. The Coast Guard does not have enough vessels to carry out its missions, and some available vessels are in poor operating condition. The Coast Guard has too few people to meet its responsibilities and has experienced a low retention rate. There are problems at some shore facilities, but GAO could not assess their overall condition because of limited Coast Guard-wide information and standards. GAO provides several options for the Senate Committee on Commerce, Science, and Transportation to consider during its oversight of Coast Guard activities, several of which would require legislative changes. The Coast Guard pointed out disadvantages with these options.

PB80-167315 PC **A03**/MF **A01**
General Accounting Office, Washington, DC. Procurement and Systems Acquisition Div.
Metropolitan Atlanta's Rapid Transit System: Problems and Progress.
Report to the Congress.
9 Apr 80, 31p PSAD-80-34

Progress and performance is good on Metropolitan Atlanta's rapid transit system, but GAO found (1) ineffective administration of the railcar contract, (2) inadequate contract provisions and record-keeping procedures for proper warranty management, and (3) replacement of public housing at costs exceeding the appraised value. Better guidance from the Urban Mass Transportation Administration could have eliminated, or at least lessened, the management weaknesses. The report includes GAO recommendations for more Urban Mass Transportation Administration input into rapid transit authority procedures and practices. Dissemination of the management experiences on this project to other transit authorities may avoid future problems.

PB80-167323 PC **A05**/MF **A01**
Georgia Inst. of Tech., Atlanta. School of Industrial and Systems Engineering.
A Decision Support System for the Outfit Planning Problem: Modeling and Conceptual Design.
Final technical rept. Sep 77-Dec 79,
Leon F. McGinnis, Jr., and Robert J. Graves. 1 Feb 80, 94p MA-RD-940-80055
Contract DO-A01-78-00-3074
Prepared in cooperation with Massachusetts Univ., Amherst. Dept. of Industrial Engineering and Operations Research.

The outfit planning problem is concerned with the production activities for other than hull steel components of ships. Traditionally, outfitting has been viewed as a successor function to steel planning. Opinion is changing, however, and the current view is that production planning should integrate the two. The report describes in detail the outfit planning problem and presents some basic elements of a decision support system for outfit planners. A formal model is developed for the outfit planning problem and the potential use of this model in a decision support system is discussed. The model leads to a difficult optimization problem, and several promising solution strategies are identified. Finally, a program is described for empirical evaluation of the proposed decision support system.

PC**$125.00**/MF**$60.00**
Community Services Administration, Washington, DC.
Geographic Distribution of Federal Funds. Fiscal Year 1979.
Rept. of the Federal Government's impact by state, county and large city, Fiscal Year 1979. Mar 80,53 issues
See also reports for Fiscal Year 1978, PB80-155567. Sponsored in part by Executive Office of the President, Washington, DC.
Also available from NTIS as set of 53 reports PC$125.00/MF$60.00, PB80-167513.

The report shows the distribution of Federal funds of the Executive Branch of the Federal Government by agency, program, and indirect federal support for every county of the United States and for each city where the population exceeds 25,000. Additionally, the data are summarized at state and National levels by agency, program, indirect federal support and budget function. State summaries are provided. A highlight of the summaries are tables which provide state rankings in terms of Federal funds received by organizational unit, demographic characteristics and major functional classification. This volume shows distribution of Federal funds to Alabama. Other individual documents are also available:

FIXS-79-01. Alabama. Mar 80, 164p PC E02, MF A01 **PB80-167521**
FIXS-79-02. Alaska. Mar 80, 79p PC E02, MF A01 **PB80-167539**
FIXS-79-03. Arizona. Mar 80, 88p PC E02, MF A01 **PB80-167547**
FIXS-79-04. Arkansas. Mar 80, 150p PC E02, MF A01 **PB80-167554**
FIXS-79-05. California. Mar 80, 343p PC E02, MF A01 **PB80-167562**
FIXS-79-06. Colorado. Mar 80, 155p PC E02, MF A01 **PB80-167570**
FIXS-79-07. Connecticut. Mar 80, 105p PC E02, MF A01 **PB80-167588**
FIXS-79-08. Delaware. Mar 80, 54p PC E02, MF A01 **PB80-167596**
FIXS-79-09. District of Columbia. Mar 80, 48p PC E02, MF A01 **PB80-167604**
FIXS-79-10. Florida. Mar 80, 193p PC E02, MF A01 **PB80-167612**
FIXS-79-11. Georgia. Mar 80, 241p PC E02, MF A01 **PB80-167620**
FIXS-79-12. Hawaii. Mar 80, 61p PC E02, MF A01 **PB80-167638**
FIXS-79-13. Idaho. Mar 80, 111p PC E02, MF A01 **PB80-167646**
FIXS-79-14. Illinois. Mar 80, 255p PC E02, MF A01 **PB80-167653**
FIXS-79-15. Indiana. Mar 80, 191p PC E02, MF A01 **PB80-167661**
FIXS-79-16. Iowa. Mar 80, 183p PC E02, MF A01 **PB80-167679**
FIXS-79-17. Kansas. Mar 80, 180p PC E02, MF A01 **PB80-167687**
FIXS-79-18. Kentucky. Mar 80, 196p PC E02, MF A01 **PB80-167695**
FIXS-79-19. Louisiana. Mar 80, 147p PC E02, MF A01 **PB80-167703**
FIXS-79-20. Maine. Mar 80, 76p PC E02, MF A01 **PB80-167711**
FIXS-79-21. Maryland. Mar 80, 120p PC E02, MF A01 **PB80-167729**
FIXS-79-22. Massachusetts. Mar 80, 157p PC E02, MF A01 **PB80-167737**
FIXS-79-23. Michigan. Mar 80, 213p PC E02, MF A01 **PB80-167745**
FIXS-79-24. Minnesota. Mar 80, 181p PC E02, MF A01 **PB80-167752**
FIXS-79-25. Mississippi. Mar 80, 162p PC E02, MF A01 **PB80-167760**
FIXS-79-26. Missouri. Mar 80, 207p PC E02, MF A01 **PB80-167778**
FIXS-79-27. Montana. Mar 80, 123p PC E02, MF A01 **PB80-167786**
FIXS-79-28. Nebraska. Mar 80, 150p PC E02, MF A01 **PB80-167794**
FIXS-79-29. Nevada. Mar 80, 74p PC E02, MF A01 **PB80-167802**
FIXS-79-30. New Hampshire. Mar 80, 71p PC E02, MF A01 **PB80-167810**
FIXS-79-31. New Jersey. Mar 80, 153p PC E02, MF A01 **PB80-167828**
FIXS-79-32. New Mexico. Mar 80, 106p PC E02, MF A01 **PB80-167836**
FIXS-79-33. New York. Mar 80, 229p PC E02, MF A01 **PB80-167844**
FIXS-79-34. North Carolina. Mar 80, 207p PC E02, MF A01 **PB80-167851**
FIXS-79-35. North Dakota. Mar 80, 114p PC E02, MF A01 **PB80-167869**
FIXS-79-36. Ohio. Mar 80, 235p PC E02, MF A01 **PB80-167877**
FIXS-79-37. Oklahoma. Mar 80, 163p PC E02, MF A01 **PB80-167885**
FIXS-79-38. Oregon. Mar 80, 116p PC E02, MF A01 **PB80-167893**
FIXS-79-39. Pennsylvania. Mar 80, 204p PC E02, MF A01 **PB80-167901**
FIXS-79-40. Rhode Island. Mar 80, 69p PC E02, MF A01 **PB80-167919**
FIXS-79-41. South Carolina. Mar 80, 123p PC E02, MF A01 **PB80-167927**
FIXS-79-42. South Dakota. Mar 80, 125p PC E02, MF A01 **PB80-167935**
FIXS-79-43. Tennessee. Mar 80, 184p PC E02, MF A01 **PB80-167943**
FIXS-79-44. Texas. Mar 80, 407p PC E02, MF A01 **PB80-167950**
FIXS-79-45. Utah. Mar 80, 94p PC E02, MF A01 **PB80-167968**
FIXS-79-46. Vermont. Mar 80, 69p PC E02, MF A01 **PB80-167976**
FIXS-79-47. Virginia. Mar 80, 235p PC E02, MF A01 **PB80-167984**
FIXS-79-48. Washington. Mar 80, 135p PC E02, MF A01 **PB80-167992**
FIXS-79-49. West Virginia. Mar 80, 123p PC E02, MF A01 **PB80-168008**
FIXS-79-50. Wisconsin. Mar 80, 175p PC E02, MF A01 **PB80-168016**
FIXS-79-51. Wyoming. Mar 80, 80p PC E02, MF A01 **PB80-168024**
FIXS-79-52. Territories and Other Areas Administered by the U.S. Mar 80, 145p PC E02, MF A01 **PB80-168032**
FIXS-79-53. Summary. Mar 80, 365p PC E02, MF A01 **PB80-168040**

PB80-168768 PC **A03**/MF **A01**
General Accounting Office, Washington, DC. Procurement and Systems Acquisition Div.
Two Navy Ship Contracts Modified by Public Law 85-804--Status as of July 29, 1979.
Report to the Congress.
22 Apr 80, 39p PSAD-80-39

The Defense Appropriation Authorization Act of 1979 requires the Comptroller General to audit and review two specific contracts for the landing helicopter assault and DD-963 destroyer ships. The audit is to ensure that funds authorized for payments under contract modifications made in the interest of national defense are being used only on the two contracts and that the contractor is not realizing any total combined profit on these contracts. GAO found that during the audit period cash reimbursements by the Navy exceeded allowable incurred costs, but the amount or use of specific Public Law 85-804 moneys could not be identified. Subsequent to the audit, incurred costs exceeded cash receipts by a significant amount.

PB80-168776 PC **A04**/MF **A01**
General Accounting Office, Washington, DC. Program Analysis Div.
How Revenue Sharing Formulas Distribute Aid: Urban-Rural Implications.
Report to the Congress.
22 Apr 80, 73p PAD-80-23

Several formulas distribute revenue sharing aid. Rural areas generally receive larger per capita grants than urban areas. This raises an apparent question of whether equity is achieved in the revenue sharing program. Resolving this equity issue requires a 'need' criterion which applies to both urban and rural areas. GAO made a case study of 57 county governments in New York State to examine the geographic distribution of 'need' based on three generally accepted criteria: fiscal capacity, fiscal effort, and fiscal pressure. The study shows that rural county governments received larger per capita revenue aid because they tended to have lower fiscal capacities and higher fiscal effort as measured by the revenue sharing formula. The study also examines what would happen to urban and rural areas if changes were made in the measurement of fiscal effort.

PB80-169402 PC **A03**/MF **A01**
Proyecto de Rehabilitacion y Diversificacion Agricolas, Tegucigalpa (Honduras).
Sistema de Comunicacion Agricola de la Secretaria de Recursos Naturales (Agricultural Communication System of the Secretariat of Natural Resources),
Irene Sica Goni. Jul 79, 45p PREDIA/IFEC-12, UNDP-FAO-HON-75/106, UNDP-FAO-HON-77/001
Text in Spanish. Sponsored in part by Agency for International Development, Washington, DC.

Presented is a final report on agricultural communication systems leading to recommendations such as the consolidation of the agricultural communications inside and outside of Honduras. Other topics include: increasing of salaries; more interchange of agricultural news publications, and support to PREDIA.

PB80-169725 PC A03/MF A01
Denver Research Inst., CO. Office of International Programs.
Sri Lanka: The Ceylon Institute of Scientific and Industrial Research,
Donald D. Evans. Dec 79, 37p
Contract AID/ta-C-1337
Report on Industrial Research Institutes: Their Role in the Aplication of Appropriate Technology and Development, Case Series No. 7.

The case history has been written to assist development planners, personnel of industrial research institutes, and USAID mission personnel in understanding the role that IRIs can and do play in the application of technology to development. It reports on the Ceylon Institute of Scientific and Industrial Research which has had many technological advancements to its credit and discusses problems in staffing, training, equipment, government and industrial relationships, and finance.

PB80-170020 PC A03/MF A01
Office of Science and Technology Policy, Washington, DC.
Basic Automotive Research in the Department of Transportation.
Feb 80, 29p

The report describes institutional and administrative arrangements necessary for the Department of Transportation to participate in the Industry-Government Cooperative Automotive Research Program.

PB80-170053 PC A06/MF A01
Federal Coordinating Council for Science, Engineering, and Technology, Washington, DC.
A Research and Development Management Approach; Report of the Committee on Application of OMB Circular A-76 to R and D.
31 Oct 79, 105p

Office of Management and Budget Circular No. A-76 establishes the general policy of the Government to buy the products and services it needs and to provide them, using Government resources, only on an exception basis. The policy recognizes, as one of the few exceptions, that certain activities are inherently governmental in nature and should be performed by Federal employees. The need for research and development activities as a Government function is recognized by the Circular through the inclusion of an 'in-house core capability' in the area of research, development and testing. It was also recognized that additional guidance was required to apply the A-76 policy to research and development activities and an interagency committee under the auspices of the Federal Coordinating Council for Science, Engineering and Technology was established to study the issues and recommend guidelines for consistent and uniform agency implementation.

PB80-170202 Not available NTIS
National Bureau of Standards, Washington, DC.
Another Inventor's View on Innovation.
Final rept.,
J. Rabinow. Mar 80, 5p
Pub. in CHEMTECH 10, n3 p144-148 Mar 80.

Innovation in the United States is suffering because our corporations are getting too large so that it is difficult for top management to be expert in all phases of the industry in which it is engaged. In the case of the conglomerates, the problems are even worse. Most of the great innovations have been made outside of large organizations and the writer is pessimistic because he believes that it is not likely that the trend to larger and larger sizes can be reversed.

PB80-171879 PC A03/MF A01
Durham Urban Observatory, NC.
Assistance in Public Administration Decisions: Implementation of Digitized Location Characters in the Management Data File of the Durham Public Safety Program. Part II.
Final rept.,
B. Burton Balfour. Nov 76, 36p HUD-0000658

This second stage of a three - stage research effort, intended to aid the development of optimal use of computer facilities and data base by the Department of Public Safety in Durham, N.C., examines the implementation of digitized locational characters in the Public Safety Programs' data files. The first phase of the study consisted of an evaluation of the Census Geographic Base File / Dual Independent Map Encoding (BGF / DIME) File (a computerized map) as a vehicle for converting the address identifications of public safety incidents to geocodes that identify the location of the incidents in a coordinate system. The second phase involved the development of summary reports from the coordinate geocodes. The first study phase consisted of the following tasks: (1) matching the addresses of recorded incidents during July 1975 with an address range of the DIME file to obtain coordinate geocodes for the recorded incident, (2) evaluation of the accuracy of the assignment of coordinates, and (3) enumeration of the shortcomings of the existing DIME File as a vehicle for obtaining coordinate geocodes for recorded incidents. Evaluation of the accuracy of the assignment of coordinates was based on site visits of a sample of the recorded incidents. Based on this sample, coordinates can be assigned to entries with an average error of 54 feet from the corrected coordinates via the DIME file. Uses of coordinate geocodes were demonstrated by recreating the grid - cell system presently used to summarize public safety incidents. A comparison of the mapping from the digitized data with a mapping made from map references of the recorded incidents showed the use of the coordinate geocoded data to be more effective in accuracy and efficiency. Supporting tabular data are provided, and the appendices contain the computer program used to compute coordinates for the incidents from the 'from' node coordinates and the 'to' node coordinates and the computer program used to map coordinate geo3) ed data into a grid - cell system written in FORTRAN language.

PB80-171887 PC A04/MF A01
Durham Urban Observatory, NC.
Assistance in Public Administration Decisions: The Public Safety Program. Part III. An Indexed Bibliography of Computer Usage in Public Safety.
B. Burton Balfour. Nov 76, 64p HUD-0000659

This third stage of a three - stage research effort, aiding the development of optimal use of computer facilities and data base by the Department of Public Safety of Durham, N.C., presents an annotated, indexed bibliography of relevant citations on the use of computers and computer technology in administrative decisionmaking for police and public safety programs. The listings are numbered for citing by title under the index topics. The index topics are administration, administrative, ALERT, assign, assignment, auto, caper, communication, communications, crime, data, digital, dispatch, JUSSIM, LEAA, leads, management, manpower, mapping, models, operations, parole, patrol, patterns, police, policies, policy, prewarns, privacy, probation, record, records, registration, report, resources, retrieval, rights, SEARCH, security, simulation, and statistical. Some 300 publications are listed.

PB80-172208 PC A03/MF A01
Arizona Governor's Office, Phoenix.
State of Arizona Planning System.
Evaluation rept.
Oct 74, 43p HUD-0000770
Prepared in cooperation with Arizona State Office of Economic Planning and Development, Phoenix, Arizona League of Cities and Towns, Phoenix and Arizona Association of Counties, Phoenix.

The conclusions and recommendations of an evaluation task force which analyzed the status of Arizona's comprehensive planning capacity are presented. The purpose of the study was to identify problems caused by existing Federal, State, and local interrelationships in an effort to better coordinate planning and service delivery programs. It is concluded that the State has made significant progress in establishing mechanisms for comprehensive intergovernmental planning and for facilitating comprehensive functional planning in the human resource area. The base for comprehensive functional planning in the natural resources and physical development areas is weak, however. It is recommended that the State of Arizona and the Western Federal Regional Council formalize an intergovernmental agreement concerning the consolidation of selected Federal planning grants. The State and the council should explore additional funding for the Councils of Government, and the council should ensure implementation of the Regional Grant Information System and continue the A - 95 Task Force. The council also should appoint a liaison officer to coordinate activities of the Intergovernmental Agreement. Both the council and the State are urged to undertake those activities necessary to coordinate and facilitate comprehensive functional planning in the natural resource field. Criminal justice planning should be better coordinated with other related agency planning. Finally, the State should institute procedures for the review and comment of new Federal planning programs and guidelines. Appendices present requirements of several Federal programs and a chart of selected Federal planning funds coming into the State.

PB80-175888 MF E10
Office of Management and Budget, Washington, DC. Office of Regulatory and Information Policy.
Data on Acquisition, Operation or Use of ADP and Telecommunications Systems in the Federal Budget for FY 1981 (Executive Branch).
Jan 80, 3170p
Available microfiche only because of poor quality.

No abstract available.

5B. Documentation and Information Technology

AD-A082 466/4 PC A04/MF A01
Office of Naval Research London (England)
European Scientific Notes. Volume 34, Number 2,
Willard D. Bascom, and Don J. Peters. 29 Feb 80, 61p Rept no. ESN-34-2

This is a monthly publication presenting brief articles concerning recent developments in European Scientific Research. It is hoped that these articles (which do not constitute part of the scientific literature) may prove of value to American scientists by calling attention to current developments and to institutions and individuals engaged in these scientific efforts.

AD-A082 470/6 MF A01
National Referral Center Washington DC
Directory of Federally Supported Information Analysis Centers, 1979. Fourth Edition.
1979, 95p
Availability: Superintendent of Documents, GPO, Washington, DC 20402 Stock no. 030-000-00115-0, HC$4.00 Microfiche furnished to DTIC (and NTIS) users.

This is the fourth edition of a directory first published in 1968 by the Committee on Scientific and Technical Information (COSATI) of the Federal Council for Science and Technology. The initial impetus for the directory came from COSATI Panel 6 on Information Analysis and Data Centers, whose members felt a directory would not only be useful but would also serve to further the concept of information analysis centers that had been a keystone among the recommendations of the seminal Weinberg report. That concept, briefly stated, is that the 'information explosion' can be dealt with more efficiently by having information sifted, weighed, analyzed, and synthesized by centers with the subject competence to do so than by merely collecting, cataloging, abstracting, uncritically disseminating documents. The second edition, published in January 1970 by COSATI, was compiled by the National Referral Center (NRC) at the request of COSATI Panel 6, whose members played an active role in deciding which centers to list. The third edition was published in 1974 by the Library of Congress, COSATI having been abolished. That edition was again compiled by the NRC, this time in consultation with an interagency ad hoc group on information analysis centers made up of former Panel 6 members. The present edition, which was compiled without formal consultation, consists mainly of updated versions of entries that appeared in prior editions; in accordance with NRC's practice, each entry was submitted to the center described therein for review.

AD-A082 548/9 PC A02/MF A01
California Univ Berkeley Electronics Research Lab

INGRES - A Relational Data Base System.
Final rept. 1 Jun 76-30 Sep 79,
M. Stonebraker, and E. Wong. Sep 79, 9p ARO-13585.14-EL
Grant DAAG29-76-G-0245

The report summarizes the progress made during a three year period on research in data base management. The primary effort has been the design development of a major data base management system of the relational type, INGRES. In addition, a number of new directions, such as distributed data bases and data base machines were initiated. (Author)

AD-A082 829/3 PC **A99/MF A01**
David W Taylor Naval Ship Research and Development Center Bethesda MD Technical/Administrative Services Dept
DTNSRDC Library Subject Thesaurus.
Preliminary edition,
Jo Anne E. Lappin, Shevra L. Martin, and Norma Lee G. Dobay. Mar 80, 763p Rept no. DTNSRDC/TASD-80/01

The DTNSRDC Library Subject Thesaurus, which exists both as a printed document and as an online computer file, supports the indexing and retrieval functions of the library's automated storage and retrieval system. The hierarchical structure of the vocabulary permits generic retrieval. For example, a search on naval vessels will retrieve documents that had been indexed under all naval ship types. Several 'switching' relationships provide an automatic cross-referencing capability.

BMFT-FB-ID-79-01 PC **A17/MF A01**
Bundesministerium fuer Forschung und Technologie, Bonn-Bad Godesberg (Germany, F.R.).
Information Systems and Information Behavior - Sociological Bases of Information Policies.
W. Bick, and P. J. Mueller. Mar 79, 390p
In German.
U.S. Sales Only.

The use of process-produced data is confronted with problems that have their origin in the very nature of administrative data. Administrative data are highly selective. Only specific aspects of reality are relevant for routine processing of cases. For administrative purposes everyday life has to be translated into administrative categories and cases. This process is difficult, problematic in principle, and error prone. The representational quality of process-produced data is therefore often questionable. Only through documentation of the contexts of data production it can be assured that these data do not lead to wrong conclusions. The report analyzes the amount and character of existing knowledge necessary to interpreting such data. It provides for a social science source criticism to improve the usefulness of process-produced data. (Atomindex citation 10:462030)

BNL-51071 PC **A02/MF A01**
Brookhaven National Lab., Upton, NY.
DOE Interlaboratory Working Group for Data Exchange (IWGDE). Progress Report, October 1978.
C. M. Benkovitz. 1978, 25p
Contract EY-76-C-02-0016

This report describes the activities of the DOE Interlaboratory Working Group for Data Exchange (IWGDE) as of October 1978. The IWGDE was created in response to an evident need for increased sharing of resources among ERDA installations. During fiscal year 1976 it was supported through funds allocated to the Energy Analysis and Assessment Programs of seven multipurpose ERDA national laboratories. During fiscal years 1977 and 1978 it was supported by direct funding from the Division of Environmental Impacts, Office of Technology Impacts, Department of Energy. Principal accomplishments included the interlaboratory exchange of socioeconomic, environmental, demographic, and energy-related data bases; liaison development through interlaboratory meetings; definition and partial implementation of a computer-independent standard for exchange of data; initial definition of a Geographic Exchange Standard and Primer, and a first attempt at the definition of content and format for a set of DOE Reference Data Bases. (ERA citation 05:012896)

BNL-51086 PC **A05/MF A01**
Brookhaven National Lab., Upton, NY.
Methodology for Coding the Energy Emergency Management Information System.
J. D'Acierno, A. Hermelee, C. P. Fredrickson, and K. Van Valkenburg. Nov 79, 87p
Contract EY-76-C-02-0016

The coding methodology for creating facility ID's and energy codes from information existing in EIA data systems currently being mapped into the EEMIS data structure is presented. A comprehensive approach is taken to facilitate implementation of EEMIS. A summary of EIA data sources which will be a part of the final system is presented in a table showing the intersection of 19 EIA data systems with the EEMIS data structure. The methodology for establishing ID codes for EIA sources and the corresponding EEMIS facilities in this table is presented. Detailed energy code translations from EIA source systems to the EEMIS energy codes are provided in order to clarify the transfer of energy data from many EIA systems which use different coding schemes. 28 tables. (ERA citation 05:012022)

COO-5075-7 PC **A02/MF A01**
American Inst. of Physics, New York.
Study of Preservation of Documents at Department of Energy National Laboratories. Progress Report, June 1, 1979-August 31, 1979.
J. N. Warnow, and S. R. Weart. Oct 79, 5p
Contract ER-78-C-02-5075

Record surveying continued at Lawrence Berkeley Laboratory. A six-month period of work at Argonne National Laboratory included studies of records in the Director's Office, records documenting physics and accelerator activities, and particularly files documenting the history of the ZGS. A survey of historical and records management programs at various government agencies with scientific responsibilities was accomplished. A report on this survey was mailed to the project's Advisory Committee, as were reports on field work at Oak Ridge National Laboratory and at Lawrence Berkeley Laboratory, and a guide for the members of the Committee representing scholarly disciplines, to help them prepare statements on the value of historical records at DOE laboratories. Preparations were begun for the Committee's October meeting. (ERA citation 05:012866)

DOE/TIC-4585-R1(Sup.4)
PC **A04/MF A01**
Department of Energy, Oak Ridge, TN. Technical Information Center.
Energy Information Data Base. Corporate Author Entries: Supplement 4, June 1978-December 1979.
Dec 79, 57p

This supplement contains additions to TID-4585-R1 (the authority list for corporate author names used by TIC), and is intended for use with that publication. Supplements are cumulative from June 1978 until another revision is issued. (ERA citation 05:014612)

ED-174 220 Not available NTIS
Ontario Inst. for Studies in Education, Toronto.
A Path Analysis Model Using Sociological Variables to Examine User Satisfaction with On-Line Education Information Systems,
Stephen E. Lawton. Apr 79, 24p
Prepared in cooperation with Ontario Dept. of Education, Toronto. Paper presented at the Annual Meeting of the American Educational Research Association, San Francisco, CA, April 8-12, 1979.
Available from ERIC Document Reproduction Service (Computer Microfilm International Corporation), Arlington, VA. 22210.

This paper presents a comprehensive framework for the evaluation of online bibliographic retrieval services and provides an example of its use with the Educational Information System for Ontario (EISO). A systems approach, incorporating traditional categories of input, output, process, and feedback, is used to develop the model; in its application, particular emphasis is placed upon assessing relationships between variables of interest at different stages in order to measure EISO user satisfaction. Methodology is described, including the sociological variables used to characterize EISO users; path diagrams and date tables are provided; and findings are discussed.

ED-174 221 Not available NTIS
Policy Manual for a Computerized Search Service in an Academic Library,
William J. Jackson. 15 Mar 79, 12p
For related documents, see ED-127 912 and ED-144 557.
Available from ERIC Document Reproduction Service (Computer Microfilm International Corporation), Arlington, VA. 22210.

This proposed policy manual for the computerized information retrieval service of the University of Houston System outlines policies for specific elements of its operation: (1) users-who is/is not eligible for service and for equipment use; (2) cost--rates charged; (3) responsibilities of searchers--maintenance of searching skills, scheduling of appointments and interviews, the search, the post-search; (4) responsibilities of the coordinator--compiling statistical reports, liaison and contact, arrangement of equipment repairs and maintenance, publicity, supervision, recommendations; (5) responsibilities of the office secretary--service to patrons, record keeping; (6) responsibilities of the library administration--staffing, funding; (7) complaints; (8) policy approval and change. An appendix describes methods of payment for computer searches conducted at the University of Houston Libraries.

ED-174 222 Not available NTIS
Maine Univ. at Orono. Raymond H. Folger Library.
Major Bibliographic Tools of Political Science,
Thomas H. Patterson. Feb 79, 16p
For related document, see ED-151 007.
Available from ERIC Document Reproduction Service (Computer Microfilm International Corporation), Arlington, VA. 22210.

Designed to introduce the student to some of the major bibliographic tools of political science found in the Raymond H. Fogler library of the University of Maine at Orono, this guide provides a systematic approach to information sources in the manner of a pathfinder. Beginning with a list of articles that are useful for defining scope, the guide moves to a delineation of subject headings, call numbers and classification, then presents annotated lists of different types of reference materials: indexes and abstracts, bibliographies, biographical sources, constitutions, dictionaries, directories, dissertations, encyclopedias, events/reports/opinions, handbooks and manuals, statistical sources, style manuals, yearbooks, and government publications. Call numbers for all sources are included.

ED-174 223 Not available NTIS
Illinois Univ. at Urbana-Champaign. Graduate School of Library Science.
Problems and Failures in Library Automation,
F. Wilfrid Lancaster. 1979, 111p
Proceedings of the 1978 Clinic on Library Applications of Data Processing, Urbana, IL, on April 23-26, 1978.
Available from ERIC Document Reproduction Service (Computer Microfilm International Corporation), Arlington, VA. 22210.

Drawn from the 15th Annual Clinic on Library Applications of Data Processing, held at the University of Illinois at Urbana-Champaign, the nine papers presented in this volume deal with problems--or, in some cases, downright failures--in the automation of various facets of library service. They range from a general survey of failures or limitations in library automation as a whole, to case studies of failures or problems encountered in specific applications or environments. More abject failures are attributed to management ineptness and bureaucratic bungling than to inadequacies in existing technology.

ED-174 235 Not available NTIS
A Written Map Acquisition Policy: The Standardized Compared with Actual Map Library Practices,
Susan Allred Mortensen. Dec 77, 65p
Available from ERIC Document Reproduction Service (Computer Microfilm International Corporation), Arlington, VA. 22210.

A standardized map policy was written based on information found in the literature for comparison with the methods which map libraries utilize in acquiring their collections. To determine the methods

actually used by the field, a questionnare was sent to 48 depository map libraries. Results substantiated the policy formulated for this study, that map librarians do use a tremendous variety of selection materials as described in the literature. Appendices include a description of the standardized map acquisition policy, the questionnaire instrument, a list of U.S. libraries with over 100,000 maps, and a list of libraries with between 50,000 and 100,000 maps.

ED-174 236 Not available NTIS
A Concise Guide to the Process and Materials of Canadian Legislation,
Patricia M. Grenier. 1979, 8p
Available from ERIC Document Reproduction Service (Computer Microfilm International Corporation), Arlington, Va. 22210.

Official and unofficial tools are described in this brief guide for the uninitiated user who is searching for Canadian federal and provincial legislation and attendant regulations. The federal information presented is related to bills of the House of Commons and Senate, printing of legislative materials, standing and revised statutes, office consolidations, and statutory orders and regulations. Provincial materials have basically the same format as those for the federal jurisdiction.

ED-174 239 Not available NTIS
Oklahoma Univ., Norman. School of Library Science.
Distribution and Availability of State and Areawide Water Quality Reports in Oklahoma Libraries,
Charles R. McClure, and Anne Million. 1979, 27p
Available from ERIC Document Reproduction Service (Computer Microfilm International Corporation), Arlington, VA. 22210.

This report examines the distribution and availability of water quality reports in the state of Oklahoma. Based on legislation from the Clean Water Act and regulations from the Environmental Protection Agency's 'Public Participation Handbook for Water Quality Management,' depository libraries must be established to provide citizen access to various water quality reports. Results from a survey questionnaire investigating the effectiveness of the depositories in Oklahoma suggest that the depository system has been ineffective in accomplishing its mandated responsibilities. Appendices include a list of agencies and depository libraries, tabulated responses of the survey of depository libraries receiving water quality materials from the three agencies designated by the governor of Oklahoma, and sources for additional information.

ED-174 240 Not available NTIS
Florida State Univ., Tallahassee.
The Effect of On-Line Search Services on Chemists' Information Style,
Gerald Jahoda. Mar 79, 325p
Grant NSF-DSI75-09604-A01
Available from ERIC Document Reproduction Service (Computer Microfilm International Corporation), Arlington, VA. 22210.

Online searches of bibliographic databases were conducted for scientists and technologists in one academic and one industrial setting. In order to determine the effect of this new technological development on its users' information-seeking habits, and to determine how, how often, and with what satisfaction online search services are used, records of use were maintained, and both users and nonusers of the online search service in the two environments were surveyed prior to the start and at the conclusion of the project's first phase. Data on over 900 uses of online search service by almost 200 users are broken down and analyzed by such factors as information sources used prior to requesting online search service, amount of negotiation time required, number of non-retrieved relevant documents, and user satisfaction with currency, size, and utility of search output.

ED-174 241 Not available NTIS
Energy Documents for the Layman: An Annotated Bibliography,
Gene Rollins. 10 May 79, 26p
Available from ERIC Document Reproduction Service (Computer Microfilm International Corporation), Arlington, VA. 22210.

This annotated bibliography of 90 post-1970 United States Government Documents and some Texas State Documents on energy conservation for the non-scientist provides overviews and analyses of the general energy situation and the energy crisis, U.S. energy policy and legislation, governmental and individual conservation measures, and alternative future sources of energy. The items were selected for use by high school and undergraduate students, and teachers and librarians working with these groups; the document search strategy and an overview of the findings are discussed. Most of the publications listed are depository items, and many are for sale by the Government Printing Office: Superintendent of Documents classification numbers are included.

ED-174 242 Not available NTIS
Far West Lab. for Educational Research and Development, San Francisco, CA.
Indicators of Educational Knowledge Production, Dissemination, and Utilization: A Conceptual Framework,
Paul D. Hood. Feb 79, 90p
Grant NIE-G-78-0203
For related document, see IR-007 519.
Available from ERIC Document Reproduction Service (Computer Microfilm International Corporation), Arlington, VA. 22210.

This report describes the conceptual framework of a study examining the feasibility of developing, on a nationwide basis, a system of statistical indicators of educational knowledge outputs, dissemination structures, and knowledge utilization settings and outcomes, along with their contextual indicators. Using the notion of social indicators to measure educational knowledge production and utilization, a model of a functional system of indicators consisting of four major components was developed: (1) production output indicators reflect the extent and ways in which the educational knowledge production community organizes and transforms knowledge in all its forms; (2) dissemination structure indicators display how resources are allocated across educational sectors and geographic areas; (3) utilization indicators provide information regarding request and usage rates by geographic or educational sectors for types of institutional and individual consumers of educational knowledge, products, and services; and (4) contextual indicators may be used to predict or explain the patterning of other types of indicators using demographic and geographic data. These indicators are examined in terms of major dimensions that may prove useful in a conceptual mapping of the indicator domain, and then in terms of implications of this dimensional mapping for the selection or development of indicators.

ED-174 243 Not available NTIS
Far West Lab. for Educational Research and Development, San Francisco, CA.
Indicators of Educational Knowledge Production, Dissemination, and Utilization: Exploratory Data Analyses,
Paul D. Hood, and Laird R. Blackwell. 28 Feb 79, 79p
Grant NIE-G-78-0203
For related document, see IR-007 518.
Available from ERIC Document Reproduction Service (Computer Microfilm International Corporation), Arlington, VA. 22210.

This report describes and analyzes statistical indicators of educational knowledge production and dissemination capability, presenting data at both the state and regional levels of aggregation. Three factors underlie 12 statistical indicators: a document production and access factor, a human-based linkage and exemplary practices factor, and a state planning and capacity building factor. A score of selected demographic, economic, and educational measures are used as potential predictors of the knowledge production and dissemination indicators. Hierarchical grouping analyses of the 50 states and the District of Columbia are made separately, and the state-level data are aggregated by the ten United States Office of Education (USOE) Regions, based first on production and dissemination indicators, and then on contextual predictors.

JPRS-75007 PC **A10**/MF **A01**
Joint Publications Research Service, Arlington, VA.
Reference Aid: Current Chinese Serial Publications, 1980 Edition.
25 Jan 80, 201p
Trans. of Chinese Jnl. Sponsored in part by Foreign Broadcast Information Service, Washington, DC.

The report is the full translation of a list of publications provided by the Beijing Post Office, which includes all titles available for subscription through the Beijing Post Office as of January 1980. The list is presented in order of numerical code, or index number, as in the original. The first part of the numerical code indicates the province of publication, which is provided in standard Chinese abbreviation in the second column in this translation. (These provincial abbreviations are spelled out in a list appended to the end of this reference aid, along with explanations of abbreviations in the 'Periodicity' column.) In this translation, the titles of periodicals are given first in Pinyin Romanization, then in Wade-Giles Romanization, third in English translation, and finally in Chinese simplified characters as they appear in the original. In those cases for which the Chinese provide a Latin title (mostly journals of the Chinese Academy of Sciences), that title is given in the third line. Following the full translation, an alphabetical list of Pinyin titles is provided for cross-referencing purposes.

N80-21190/7 PC **04**
National Aeronautics and Space Administration, Washington, DC.
Nasa Patent Abstracts Bibliogrpahy. A Continuing Bibliography. Section 1: Abstracts, Supplement 16.
Jan 80, 59p NASA-SP-7039(16)-Sec 1

Abstracts are cited for 138 patents and patent applications introduced into the NASA scientific and technical information system during the period July 1979 through December 1979. Each entry citconsists of a citation, an abstract. and in most cases, a key illustration selected from the patent or patent application.

PB80-167331 PC **A03**/MF **A01**
Baldwin (Fred D.), Carlisle, PA.
The National Consumer Law Center Energy Project: A Plan for Evaluation,
Fred D. Baldwin. 1 Jun 78, 31p CSA-LN-2416
Contract CSA-B8B-5566

Located in Boston, the NCLC itself is one of seventeen support centers (formerly called 'backup' centers) created by the OEO Office of Legal Services Corporation (LSC). The main function of these centers is to provide expert legal advice on cases within their respective problem areas to local LSC attorneys and others engaged in poverty law.

PB80-167406 PC **A04**/MF **A01**
Executive Office of the President, Washington, DC. Office of Administration.
Toward an Information Efficient Executive Office of the President.
15 Feb 80, 75p

The President makes many significant decisions each month, most having to do with policy questions which provide direction for lower level decisions and which impact thousands and sometimes millions of people. At the other extreme, a human services case worker will make numerous decisions each month directly impacting a few hundred individuals. There is an ever increasing amount of information these individuals must consider in making their decisions. This increase is due in part to the increasing complexity of government's involvement in our society and in part to the increase in the number of organizations involved in the decision making process. Somewhat parallel with the government's increased involvement in our society has been an increase in the number of organizations that feel they should be actively involved in the decision making process. The task is made more complicated by the fact that the information may take any of a variety of forms. If it is written it may be in the form of a letter, an article, a press release, an official document such as an executive order, a book or a report. Verbal communication occurs at briefings, hearings, meetings, over the phone and through radio and television. The Executive Office of the President exists to help the President manage that portion of the information

that affects his decisions. This analysis of requirements is based upon an overall review of the EOP and is not intended to provide a unit by unit analysis nor deal with the highly specialized needs of some of the work groups.

PB80-169329 PC **A04**/MF **A01**
National Bureau of Standards, Washington, DC. Library Div.
Abstract and Index Collection - National Bureau of Standards Library,
Diane Cunningham. Jan 80, 63p NBSIR-80-2009

An alphabetical arrangement of abstracts and indexes available at the National Bureau of Standards (NBS) Library is listed by most current title of the publication. Other information includes description of the abstract or index, library holdings, principal sources, publisher or association, corresponding data base and the classification number. A general subject index follows the main text of the report.

PB80-169964 PC **A02**/MF **A01**
Woods Hole Oceanographic Institution, MA.
Bibliography of Technical Reports, 1979.
Technical rept.,
Ruth B. Spivey. Apr 80, 18p WHOI-80-14
See also report dated 1978, PB-295 727.

The technical reports prepared by the Woods Hole Oceanographic Institution in 1979 on oceanography are listed in this bibliography.

PB80-173834 CP **T11**
Vermont Univ., Burlington. PROMIS Lab.
Automated Problem-Oriented Medical Information System (PROMIS) Data Tape.
Data file,
Richard M. DuBois, and Layton Davis. 1978, mag tape DHEW/DF-80/002
Contract PHS-HRA-230-76-0099, Grant PHS-HS-00175
Supersedes rept. no. DHEW/DF-79/002, PB-300 419.
Source tape is in ASCII character set. Character set restricts preparation to 9 track one-half inch tape only. Identify recording mode by specifying density only. Call NTIS Computer Products if you have questions. Price includes documentation, PB80-173842.

These data tapes house a copy of all the PROMIS frames and tables, and the data structures comprising the PROMIS medical data base. The frames and tables are used to store data, to create displays for viewing on a CRT screen, and to branch from display to display when choices on the displays are selected. Each frame or table is a paragraph. A logical group of paragraphs is a file. The number of files on any tape is arbitrary. To interpret these data structures, the Functional Specification of a PROMIS Instance System, Level II is required (NTIS Interim Report No. NCHSR 80-30). These data tapes will be periodically updated. 'Documentation for PROMIS Tapes Containing Frames, Tables, and Program Source' accompanies the tapes. 'Automated Problem-Oriented Medical Information System (PROMIS): Functional Specification of A PROMIS Instance System' (NTIS Interim Report NCHSR 80-30) must be ordered separately from the tapes (NTIS Interim Report NCHSR 80-28).

PB80-173842 PC **A23**/MF **A01**
Vermont Univ., Burlington. PROMIS Lab.
Automated Problem-Oriented Medical Information System (PROMIS). Functional Specification of a PROMIS Instance System.
Apr 80, 550p DHEW/DF-80/002A
Contract PHS-HRA-230-76-0099, Grant PHS-HS-00175
For system on magnetic tape, see PB80-173834, and PB80-173859.

The problem oriented medical philosophy is embodied in a computer system in operation at the Medical Center Hospital of Vermont in Burlington, Vermont, developing solutions to important problems in medicine via innovations in the practice of medicine and in the design and use of computer hardware and software. Users of the system make selections on displays, presented at touch-screen terminals, which embody a guidance system of medical knowledge and data retrieved from electronically prepared records which themselves have been generated by interactions with the guidance system. The Functional Specification describes the building blocks of this system -- the medical guidance structure, characteristics of the display medium, medical data base language, application programming languages, software modularization and file system -- and is structured to allow people of varying technical and medical interests and capabilities to understand and implement some or all of the concepts and tools of PROMIS. The tapes and documentation are periodically updated.

PB80-173859 CP **T06**
Vermont Univ., Burlington. PROMIS Lab.
Automated Problem-Oriented Medical Information System (PROMIS) Computer Program Source Tape.
Software,
Richard M. DuBois, and Layton Davis. 1978, mag tape DHEW/DF-80/003
Contract PHS-HRA-230-76-0099, Grant PHS-HS-00175
Supersedes rept. no. DHEW/DF-79/008, PB-300 421.
Source tape is in ASCII character set. Character set restricts preparation to 9 track one-half inch tape only. Identify recording mode by specifying density only. Call NTIS Computer Products if you have questions. Price includes documentation, PB80-173842.

All software structures forming the computerized Problem-Oriented Medical Information System (PROMIS) are included on these three computer program source tapes. The source files are written in a number of languages, the most prevalent being the PROMIS Programming Language (PPL), designed expressly for this application. The code bodies represented by these source files form subsystems, each of which is responsible for a phase of the processing of requests entered at terminals by system users. Most of these requests are in the form of choice selection, performed by touching the screen in the vicinity of the choice. The selection is processed, generating requests at various levels of system activity, depending upon the request, such as storage into patient records, terminal or disk I/O, display creation, retrieval of data from patient records, etc. These source tapes will be periodically updated...Software Description: The program is written in the Fortran programming language for implementation on a Sperry-Univac computer using the Vortex II Version E.2 operating system. 512K bytes of core storage are required to operate the model. 'Documentation for PROMIS Tapes Containing Frames, Tables, and Program Source' accompanies the tapes. 'Automated Problem-Oriented Medical Information System (PROMIS): Functional Specification of A PROMIS Instance System' (NTIS Interim Report NCHSR 80-30) must be ordered separately from the tapes (NTIS Interim Report NCHSR 80-29).

PB80-174634 PC **A08**/MF **A01**
National Marine Fisheries Service, Washington, DC. Office of Resource Conservation and Management.
United States Fisheries Systems and Social Science: A Bibliography of Work and Directory of Researchers,
Michael K. Orbach, and Valerie R. Harper. Aug 79, 161p NOAA-80031201

The volume consists of two documents, a bibliography of published, unpublished, and current research work among fishermen and in fishing communities in the United States, its territories and possessions, and a directory of the researchers who have performed this work or who are interested in these subjects. Along with four appendices, the entries in the bibliography and directory were obtained through a variety of approaches; a response form mail-out; literature and data bank searches; and a more general, network-based search performed by the editors. A list of the sources and data banks which were used appears in the appendices, as well as a list of other bibliographical works on this general subject. The remaining appendices provide materials for updating and improving the bibliography and directory.

PB80-175060 PC **A07**/MF **A01**
Centro de Investigacion y Capacitacion R.L., San Jose (Costa Rica).
Informe del Programa de Capacitacion Centroamericana (Report on the Capacitation Program of Central America),
Tito Quiros, Aldo Cardona, and Ricardo Puerta. 1979, 144p
Text in Spanish. Sponsored in part by Agency for International Development, Washington, DC.

The report gathers the experience accomplished in the Capacitacion Program in Central America, which lasted a period of two years (1977-1978) in the six countries in Central America. It includes orientations about projects of capacitation utilizing the participating methodology. It includes course and seminar design whose content derived from the process and experience of the participants.

5C. Economics

AD-A082 517/4 PC **A04**/MF **A01**
Army Armament Materiel Readiness Command Rock Island IL Cost Analysis Div
Models for Estimating Economic Price Adjustment (EPA) Fund Requirements.
Technical rept.,
Gerald W. Kalal. Feb 80, 58p Rept no. DRSAR-CPE-80-1

In the current economic environment, it is prudent strategy for the Government to avoid the use of Economic Price Adjustment (EPA) clauses in procurement contracts. However, many vendors are insisting upon the inclusion of contractual EPA stipulations as a hedge against inflation. Consistent with the use of EPA clauses, Procuring Contracting Officers (PCO's) typically were committing EPA funds up to the contractual ceiling to assure that an over obligation of funds (an RS3679 violation) would never occur; a practice found to reserve funds in excess of requirements. Examined herein are current methods of determining the level of EPA funds to be reserved and the development of some improved methods for estimating these requirements. This management tool provides structured formulae which can improve justification of retained/committed EPA funds and allow the release of committed funds for use elsewhere. (Author)

DOE/EIA-0184/24 PC **A04**/MF **A01**
Department of Energy, Washington, DC. Energy Information Administration.
Commercial Nuclear and Uranium Market Forecasts for the United States and the World Outside Communist Areas. Analysis Report AR/ES/80-02.
R. G. Clark, and A. W. Reynolds. Jan 80, 60p

Nuclear power forecasts prepared by the Energy Information Administration (EIA) of the United States Department of Energy are presented. The domestic forecasts from the EIA Annual Report to Congress for 1978 (published in July 1979) are detailed for the two time frames considered in the EIA analytical hierarchy: the midterm, encompassing the 1985, 1990, and 1995 milestones and the long term, beyond 1995 to the year 2020. EIA nuclear forecasts for the balance of nations in the World Outside Communist Areas (WOCA) are also presented through the year 2000. In turn, an assessment is made of the uranium consumption requirements implied by both the domestic and WOCA nuclear power forecasts. A discussion is included of appropriate fuel cycle assumptions, sensitivities, and price projections. (ERA citation 05:013545)

DOE/ERA/6385-1 PC **A07**/MF **A01**
Resource Planning Associates, Inc., Cambridge, MA.
Power Pooling: Issues and Approaches.
Jan 80, 142p
Contract EB-78-C-01-6385

Power pools consist of two or more electric-utility systems that coordinate planning and operations to achieve economies of scale, minimize operating cost, conserve fuel, and increase the reliability of their bulk power-supply systems. Presently, 38% of the electricity consumed in the US is generated by interconnected utilities with formal, pool-wide agreements. DOE's Economic Regulatory Administration has begun a comprehensive program to encourage coordination among electric utility systems. This report covers procedures and agree-

ments adopted by four power pools: the Florida Electric Power Coordinating Group; the New York Power Pool; the Pennsylvania-New Jersey-Maryland Interconnection; and the New England Power Pool. (ERA citation 05:012042)

FE-3055-T1(V.1) PC **A99**/MF **A01**
Pittsburg and Midway Coal Mining Co., Denver, CO.
SRC-II Demonstration Project. Phase Zero, Task Number 3: Deliverable Number 9. Volume 1. Market Assessment: Market Opportunity for SRC-II Fuel Oil.
31 Jul 79, 674p
Contract ET-78-C-01-3055

SRC-II fuel oil is potentially attractive as a fuel for generating electric power for the following reasons: (1) SRC-II fuel oil, at presently estimated costs, would be expected to be economically competitive with replacing oil in existing oil-fired boilers, fueling new oil-fired boilers in East Coast urban locations, and fueling new combined cycle combustion turbines at today's level of technology and new advanced combined cycle combustion turbines at forecasted levels of technology regardless of utility location. (2) At the projected estimate of SRC-II fuel oil costs, SRC-II fuel oil would be expected to be economically competitive in Eastern urban areas compared to other means of coal utilization for electric power generation. This includes boilers with flue gas desulfurization, with on-site or off-site sludge disposal, and coal gasification integrated with advanced combined cycle combustion turbines. (3) The SRC-II fuel oil alternatives would have the additional advantage of being an environmentally clean method of generation which would not present waste control problems at the site of electric power generation. This is especially important for the electric power generation demands of the populous East Coast region. When the above considerations are combined in a utility systems analysis with the higher reliability of simple-to-operate and maintain oil-fired generating equipment, the SRC-II fuel oil alternatives emerge having the potential to provide a lower revenue requirement to the utility system, when used in conjunction with nuclear base load power generation, by providing electric power in a broad range of load classification and for regions in addition to East Coast urban areas. The dominant economic theme is the inability of the direct use of coal alternatives to offset their higher capital and operating costs with the lower fuel cost of coal, compared to the estimated cost of SRC-II fuel oil. (ERA citation 05:009621)

FE-3055-T1(V.3) PC **A11**/MF **A01**
Pittsburg and Midway Coal Mining Co., Denver, CO.
SRC-II Demonstration Project. Phase Zero, Task Number 3: Deliverable Number 9. Volume 3. Market Assessment: Utilization in Electric Utility Industry, Supporting Results.
31 Jul 79, 244p
Contract ET-78-C-01-3055

These studies, made with the involvement of Consolidated Edison of New York, Baltimore Gas and Electric, Boston Edison Company, and Florida Power Corporation, indicate SRC-II fuel oil could be a significant and economically competitive fuel for electric power generation in the populous east coast region of the United States. These studies included a range of applications: replacing oil in existing oil-fired boilers, fueling new oil-fired boilers, new combined cycle combustion turbines at today's level of technology, and new advanced combined cycle combustion turbines at forecasted levels of technology. In all cases, using the projected estimate of SRC-II fuel oil costs, SRC-II fuel oil was indicated as a viable alternative when compared to other means of coal utilization, which includes boilers with flue gas desulfurization (FGD) with on-site or off-site sludge disposal and coal gasification integrated with advanced combined cycle combustion turbines. In almost all cases, the dominant economic theme is the inability of the direct use of coal alternatives to offset the higher capital cost of these alternatives with the lower fuel cost of coal compared to the estimated costs of SRC-II fuel oil. In addition to the economic and financial advantages, the SRC-II fuel oil alternatives are judged as having the additional potential of being a simple and efficient, environmentally clean oil-fired method of generation, which furthermore would not present waste control problems at the site of electric power generation. (ERA citation 05:009623)

FE-3055-T1(V.9) PC **A09**/MF **A01**
Pittsburg and Midway Coal Mining Co., Denver, CO.
SRC-II Demonstration Project. Phase Zero, Task Number 3: Deliverable Number 9. Volume 9. Market Assessment: Petroleum Markets Outlook, Supporting Reports.
31 Jul 79, 183p
Contract ET-78-C-01-3055

This report was prepared for Pittsburg and Midway Coal Mining Co. to project the world petroleum outlook to 2000, with emphasis on the US situation, but within the perspective of world energy and economic activity. In fact, the oil outlook - supply, demand, and most important, price - is derived by our system of balancing economic growth with energy supply, demand, and price. A single set of projections is adopted as the most probable as of June 1979, but the outlook may change as it has been changing over the past decade: In the early 1970s, we anticipated a rising real price for oil and considered that the true market price in 1973 was at least $5 a barrel (FOB Saudi marker crude) but acknowledged that how much above $5 a barrel was indeterminate. As it turned out, the market price was $10 a barrel. In 1974-75, we projected no real increase in the price of oil to 2000. In 1976-78, we projected that the real price would escalate at 3% per year to 2000. In this June 1979 outlook, we project rising real prices at 5% to 6% per year on a higher base for 1979. A major cause of this revision is the permanent loss of MMBD of production in Iran, or so the situation there is viewed. These changes have been caused principally by disappointments (except in Mexico) in exploration results. This in turn encourages some members of OPEC to constrain production still further. The last and most serious event is the dramatic decrease in Iranian production and the clear indication that 2 MMBD of the reduction is permanent. (ERA citation 05:009629)

LA-UR-80-307 PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
Economics of Geothermal Energy.
G. E. Morris, J. W. Tester, and G. A. Graves.
1980, 12p CONF-800216-1
Contract W-7405-ENG-36
American Nuclear Society topical meeting, Los Angeles, CA, USA, 27 Feb 1980.

A selected summary is presented of the resource, technical, and financial considerations which influence the economics of geothermal energy in the US. Estimates of resource base and levelized busbar cost of base load power for several types of geothermal resources are compared with similar estimates for more conventional energy resources. Current geothermal electric power plants planned, under construction, and on-line in the US are noted. (ERA citation 05:013411)

N80-21213/7 PC **A03**/MF **A01**
Strasbourg-1 Univ. (France). Bureau d'Economie Theorique et Appliques.
Innovations and Technology Transfer. The Role of the European Space Agency. Volume 2: Annexes Innovations et Transferts Technologiques: Le Role de l'Agence Spatiale Europeene, Rapport Annexe.
P. Brendle, P. Cohendet, R. Laruedetournemine, H. Schmied, and D. Vitry. Feb 79, 41p ESA-CR-(P)-1219-V-2
Contract ESA-3669/78-F-DKR(SC)
Text in French.

The economic measures used to determine the contributions of ESA and the methods of data analysis are described. An analysis of present and proposed market impact of 37 product areas, including the financial contribution attributes to ESA activities is presented. Efforts of various European governmental agencies to promote technology transfer are outlined.

PB80-160286 PC **E03**/MF **A01**
California Univ., Riverside. Dry Lands Research Inst.
The Input-Output Structure of the U. S. Mineral Industries for 1958 and 1963: Transactions, Employment and Multipliers.
Open file rept. (Final),
H. Craig Davis, and Everard M. Lofting. Apr 79, 62p BUMINES-OFR-20-80
Grant G0133091
Document includes 2 48X MF inserts.

Input-output transactions tables for the economic years 1958 and 1963 for the United States are presented. The tables were developed to show the detailed structure of the U.S. mineral industries at the 3- and 4-digit SIC code level. Output multipliers and types I and II employment and income multipliers were developed on a comparable basis and are presented for both years.

PB80-161425 MF **A01**
California Univ., Riverside. Dry Lands Research Inst.
Development of Interindustry Transactions Data on the Structure of United States Mining Industries for 1967 and a Comparison of Techniques for Updating Related Input-Output Coefficients.
Open file rept. (Final),
H. Craig Davis, and Everard M. Lofting. 30 Apr 79, 50p BUMINES-OFR-19-80
Grant G0122078
Document contains 2 sheets 24X MF inserts.
Available Microfiche only because of poor quality.

The paper deals with two problems associated with input-output models: disaggregation and updating. National input-output models are commonly designed as general purpose models. Analysts with specialized interests will at times find that the segment of the economy on which their particular interests are focused is too highly aggregated. In this context, the procedure used for disaggregating the 7 mining sectors in the 1967 U.S. input-output table to 47 sectors is discussed. A second potential problem associated with input-output models arises from changes over time in the relationships between economic sectors. If the technical coefficients of the input-output model are not accordingly adjusted to reflect these changes, significant errors in the model's output may result. The two most prominent techniques designed to update the input-output model's technical coefficients, the RAS and linear programing (LP) methods, are compared with regard to changes in U.S. national coefficients between 1963 and 1967.

PB80-165608 PC **A16**/MF **A01**
Wharton EFA, Inc., Philadelphia, PA.
An Analysis of the Automobile Market: Modeling the Long-Run Determinants of the Demand for Automobiles. Volume II - Simulation Analysis Using the Wharton EFA Automobile Demand Model.
Final rept. Sep 75-Mar 77,
George R. Schink, and Colin J. Loxley. Dec 79, 353p DOT/TSC/NHTSA-79-49-2, DOT-HS-804 848
Contract DOT-TSC-1072
See also Volume 1 dated Dec 79, PB80-143316 and Volume 3, PB80-166580.

An econometric model is developed which provides long-run policy analysis and forecasting of annual trends, for U.S. auto stock, new sales, and their composition by auto size-class. The concept of 'desired' (equilibrium) stock is introduced. 'Desired stock' and its composition by size-class are related to numerous economic and demographic variables using cross-section data. Among them is a new 'capitalized cost per mile' measure, which expresses all costs over time relative to miles driven, discounted back to the present. New registrations, total and by class, and scrappage are found to be strongly related to 'desired stock' relative to actual stock, with other influences operating as 'speed of adjustment' factors. Fuel efficiency is analyzed in detail, relating mpg by class to physical vehicle characteristics and technological developments. Purchase prices and options expenditures are analyzed and all cost measures distinguished by foreign vs domestic origin as well as by size-class. Volume I summarizes and describes the study, and contains a forecast through 2000. Volume II contains extensive simulation analysis, with public policy implications. Volume III contains data and methodology appendices.

PB80-166580 PC **A12**/MF **A01**
Wharton EFA, Inc., Philadelphia, PA.
An Analysis of the Automobile Market: Modeling the Long-Run Determinants of the Demand for Automobiles. Volume III - Appendices to the Wharton EFA Automobile Demand Model.
Final rept. Sep 75-Mar 77,
George R. Schink, and Colin J. Loxley. Dec 79, 274p DOT-TSC-NHTSA-79-49-3, DOT-HS-804 855
Contract DOT-TSC-1072
See also Volume 1, PB80-143316 and Volume 2, PB80-165608.

An econometric model is developed which provides long-run policy analysis and forecasting of annual trends, for U.S. auto stock, new sales, and their composition by auto size-class. The concept of 'desired' (equilibrium) stock is introduced. 'Desired stock' and its composition by size-class are related to numerous economic and demographic variables using cross-section data. Among them is a new 'capitalized cost per mile' measure, which expresses all costs over time relative to miles driven, discounted back to the present. New registrations, total and by class, and scrappage are found to be strongly related to 'desired stock' relative to actual stock, with other influences operating as 'speed of adjustment' factors. Fuel efficiency is analyzed in detail, relating mpg by class to physical vehicle characteristics and technological developments. Purchase prices and options expenditures are analyzed and all cost measures distinguished by foreign vs domestic origin as well as by size-class. Volume I summarizes and describes the study, and contains a forecast through 2000. Volume II contains extensive simulation analysis, with public policy implications. Volume III contains data and methodology appendices.

PB80-166986 PC **A03**/MF **A01**
National Council for Urban Economic Development, Washington, DC.
Building Local Economic Development Capacities.
Annual rept. 16 Dec 78-15 Dec 79.
1979, 31p EDA-80-058
Grant EDA-99-06-07012
See also report for 1978, PB300 317.

The report is the 1979 Annual Report of the CUED organization, covering the period December 16, 1978 - December 15, 1979. CUED's success is in building local economic development. As the lead agency in the field, more and more cities are relying on CUED to provide clearinghouse services, technical assistance, current information on the status and use of federal programs, and longterm research on issues of major importance to local practiontioners. As urban problems become more and more complicated, cities in the 1980s will require more assistance than ever before. CUED looks forward to advancing the state-of-the-art in urban economic development and to maintaining a reputation unsurpassed in the field.

PB80-168974 PC **E12**/MF **E12**
International Inst. for Applied Systems Analysis, Laxenburg (Austria).
The Bratsk-Ilimsk Territorial Production Complex: A Field Study Report.
Final rept.,
H. Knop, and A. Straszak. cMay 78, 381p RR-78-2

The report covers six major aspects of the BITPC program: goals, variants, and strategies; planning and organization; model calculations and computer applications; integration of environmental factors; energy supply systems; and water resources. It is hoped that the experience of the Soviet scientists and practitioners and the observations and suggestions of the study team will provide the IIASA National Member Organizations with insights into problem solving in the management, planning, and organization of large-scale development programs. (Copyright (c) 1978 IIASA.)

PB80-169022 PC **E03**/MF **E03**
International Inst. for Applied Systems Analysis, Laxenburg (Austria).
The Computation of Optimum Linear Taxation.
Final rept.,
Christopher J. Heady, and Pradeep K. Mitra. cOct 79, 45p RR-79-6

The report examines the first part of a study undertaken to assess the redistributive leverage provided by different instruments of planning. It is devoted specifically to the analysis and computation of optimal redistributive policies in small, general equilibrium models of economic planning. (Copyright (c) 1979, International Institute for Applied Systems Analysis.)

PB80-169048 PC **A02**/MF **A01**
Mathematica Policy Research, Inc., Princeton, NJ.
Survey of Trade Adjustment Assistance Recipients; Executive Summary,
Walter Corson, Walter Nicholson, David Richardson, and Andrea Vayda. Dec 79, 13p
Contract DL-J-9-K-7-0010
See also report dated Dec 79, PB80-165129.

The trade adjustment assistance program is concerned with workers harmed by the market fluctuations that result from unrestricted international trade. The TAA program provides two types of benefits: (1) a cash payment intended to reimburse workers for earnings lost through unemployment or reduced hours, and (2) employment and related services intended to help individuals find new jobs elsewhere. These services are designed to speed the necessary adjustment in production away from import-competing industries, thereby reducing the cost to workers and to society of the adjustment process. The study was designed to provide information to policymakers concerning the characteristics of recipients under the 1974 Trade Act and to analyze the program's effect on them. Personal interviews with 963 TAA recipients were conducted between November 1978 and February 1979. Data were collected describing the labor market and other activities of the sample from the time of the initial job dislocation that established TAA eligibility to the interview date.

PB80-169253 MF **A01**
Department of Commerce, Washington, DC.
Business America - The Journal of International Trade. Volume 3, Number 8, April 21, 1980.
Bi-weekly pub.
21 Apr 80, 48p
See also Volume 3, Number 7, PB80-161565.
Paper copy available from Supt. of Docs.

Contents:
- Egypt--implications of peace for U.S. business;
- Trading companies pushed as vehicle for exports;
- The role of countertrade in China's development;
- U.S. furniture proves popular in Saudi Arabia;
- Washington trade briefs;
- Economic highlights;
- Business outlook abroad;
- Worldwide business opportunities.

PB80-169345 PC **A03**/MF **A01**
Boise State Univ., Idaho. Center for Research Grants and Contracts.
Idaho International Trade Directory, 1979.
Final rept.,
Earl H. Fry, and Susan S. Medlin. 30 Jan 80, 40p
Contract PNRC-10990069

Information in this directory has been divided into several sections to facilitate use: Section I--Geographical listing of companies by city within Idaho; Section II--Products exported by SIC code; Section III--Company listing, alphabetical; Section IV--Country of international activity, alphabetical; Section V--Trademarks, alphabetical; Section VI--Support services for international trade activities; and Section VII--Products and services exported, alphabetical.

PB80-169444 PC **A08**/MF **A01**
Universidad Centroamericana Jose Simeon Canas, San Salvador (El Salvador).
Papel de la Tecnologia en el Desarrollo Y Dependencia de los Pueblos (The Role of Technology on the Development and Dependency of Countries).
Feb 79, 168p
Text in Spanish. Sponsored in part by Agency for International Development, Washington, DC.

The patterns of economic growth experienced in Latin America countries are discussed, mainly during the last 20 years. Some attention is given to the philosophical meaning of appropriate technology, and to the nutritional problems in Latin America and their relationship with economics. Some of the themes studied include: Efficiency and justice in the utilization of technology; examples of developing with unappropriate technology; the role of agriculture and sciences and technology of foods, and others. An abundant bibliography, some statistics, and tables are included.

PB80-170699 PC **A04**/MF **A01**
Stanford Univ., CA. Center for Research in Economic Growth.
Rate Structure and Open Entry: The Problem of Regulating Competition,
Ronald Braeutigam, Bruce Owen, and Thomas Ulen. Feb 74, 70p M-166, NSF-RA-S-74-118
Grants NSF-GJ-36392, NSF-GI-39613

The nature of the interdependence among the variables available to regulatory control are discussed along with the consequent need for regulatory authorities to use these controls in a coordinated fashion. Variables include rate of return, tariff levels structure, entry conditions or licensing, construction authority, service quality levels, and conditions of access by users. In order to provide a framework within which to describe the most commonly used tests of interservice subsidy, a model of a multiproduct, rate-of-return regulated firm was developed. Specifically, the method of fully distributed costs, the marginal cost test, the incremental cost test, the burden test, the stand-alone test, and the method of maximizing consumers' and producers' surplus are discussed. The sets of prices (tariffs) which each defines to be free of subsidy are compared, and the relation of each to economic efficiency is also explored. Finally, the interdependence of tariffs with the other variables available to the regulatory authority is addressed with emphasis on the critical need to coordinate decisions about tariffs with policies concerning market structure. The paper suggests that well informed and insightful regulation can, with existing tools, achieve results supprior to those now being achieved.

PB80-170715 PC **A12**/MF **A01**
Washington State Dept. of Transportation, Olympia. Public Transportation and Planning Div.
Impact of Highway Improvements on Property Values in Washington.
Final rept.,
Raymond B. Palmquist. Mar 80, 255p WA-RD-37.1

The objective of the research was to examine the effects that construction of a major highway has on the value of surrounding properties, a topic which is of great public concern. Information was obtained on actual sales prices, as well as the characteristics of the properties. Four residential study areas were used, and as many as 4,785 sales were obtained in each area. The information on building and neighborhood characteristics was used to generate a quality-adjusted price index. This index for the years during which a highway was opened was then compared with an index for an area which had been unaffected by highway change. The results show that when the highway significantly increased the accessibility of the residences, property values increased by 12 to 15 percent. Unfortunately, the houses closest to the highway had this increase partially offset by a .2 percent to 1.2 percent reduction for each 2 1/2 dBA increase in the highway noise level.

PB80-170889 PC **A05**/MF **A01**
Martech Associates, Inc., Portland, OR.
Foreign Investment in the Pacific Northwest, 1979: An Inventory of Nondomestic Investments Made in the Pacific Northwest.
Final rept. 8 Aug 79-31 Jan 80.
Jan 80, 78p
Contract PNRC-10990098

The 1979 inventory presented in the report was initiated by the Pacific Northwest Regional Commission to provide an inventory of manufacturing, nonmanufacturing, resource acquisition, including real estate and financial corporations funded by foreign capital in the states of Idaho, Oregon, and Washington. The study task was to identify foreign investors in the Pacific Northwest and to gather se-

lected economic data relative to the investments so their role in Northwest economic development can be better evaluated.

PB80-171325 PC **A03**/MF **A01**
Economics, Statistics, and Cooperatives Service, Washington, DC. National Economics Div.
Balancing Supply With Demand for Fluid Milk Markets - A Cost Comparison,
Floyd A. Lasley, and Lynn G. Sleight. Oct 79, 45p

Balancing supply with demand for fluid milk continues to be a costly function. The report measures variability of demand by fluid bottling plants when balancing is accomplished at different levels of aggregation. Costs of manufacturing the milk which is reserve to the variable demands by fluid bottling plants are compared for individual plant balancing and for balancing when coordinated at the market level.

PB80-172216 PC **A04**/MF **A01**
Urban Inst., Washington, DC.
Developer Supply, Investor Demand, and Multifamily Housing Production: A Model Design.
Margery J. Austin, and C. Duncan Macrae. Aug 78, 74p HUD-0000772
Contract HUD-H-2162R

This paper develops a model to project the potential impact of various tax policies on the level of multifamily housing production and rehabilitation. It attempts to overcome the weaknesses of traditional cash - flow models by using actual projects, not hypothetical models, to study variations in project characteristics. It also calculates coverage ratios in addition to internal rates of return because coverage ratios are more important to passive investors. This paper evaluates the immediate impact of policy alternatives by calculating fees paid to builder - developers rather than rents or rates of return. Data for the model are easily available from Federal Housing Administration and State housing finance administration forms. The model user first collects data from a sample of actual development projects and calculates a builder - developer fee for each. Then either nonlinear least squares or maximum likelihood estimation methods are used to infer the parameters of the logic function and the potential project distribution. Finally, actual project distribution in the area would be modified to represent the underlying distribution of potential projects. A pilot study in one HUD region is recommended to test the validity of this concept. This nontechnical presentation is illustrated with statistics, sample data collection forms, sample model outputs, and references.

PB80-172224 PC **A04**/MF **A01**
Urban Inst., Washington, DC.
Decision Analysis: A Review of Literature Relevant to Builder-Developer Behavior.
Carla I. Pedone. Sep 78, 74p HUD-0000773
Contract HUD-H-2162R

The five primary components of contemporary decision theory are applied to builder - developer behavior in the production of subsidized multifamily housing. This is essentially a problem of decisionmaking under conditions of uncertainty, and as such, contains many parallels in the fields of oil and gas exploration and research and development. The decision process begins with the specification of a decision tree. Three types of trees appear in oil and gas exploration and research and development literature: a traditional tree which lists all alternatives with potential outcomes of each, stochastic trees which add continuous outcome variables to the traditional framework, and project trees which represent discrete periods of action and risk. The three types combined describe builder - developer behavior. The initial phases of a project follow the traditional model, while stochastic and project models come into play at the later stages of project planning. The evaluation of costs and benefits may be made on the basis of empirical data, subjective estimates, or a Bayesian methodology which estimates probabilities. The assignment of choice criteria and the implementation of a solution algorithm to determine the optimal first choice complete the process. Since builder - developer behavior has so many elements in common with oil and gas or research and development behavior, the literature from these fields can be used to construct models to study builder decisionmaking in the subsidized multifamily housing field. Tables, illustrations, and an extensive bibliography are included.

PB80-172232 PC **A02**/MF **A01**
Urban Inst., Washington, DC.
National Housing Models and the Income Tax: A Feasibility Study.
J. Eric Fredland, and C. Duncan MacRae. Aug 78, 20p HUD-0000774
Contract HUD-H-2162R

Two types of models could be used to study the effects of the real estate investor provisions of the income tax, especially Section 8, on housing -- either a housing sector model or a full structural model of the national economy in which a well - developed housing sector is embedded. Neither approach contains the necessary tax structure detail, indicating that any model used would have to be significantly modified. A full model would point out complex feedbacks which would otherwise remain obscured, but larger and thus more complex models are more susceptible to the dangers of misspecification. The literature contains 35 housing sector models which could be modified for use in a Section 8 income tax analysis. Eight national economy models exist, but none has a housing sector which could be used without modification. However, the desirability of using a full sector model and the costs of developing a new model make modification of one of these existing software programs the most feasible course. There are three approaches to modification: (1) approximating tax changes by altering constant terms and coefficients in existing equations, (2) developing a satellite model which can feed into the main model at one or more points, and (3) modifying existing equations. The third approach is recommended, although it is the most expensive. Since four of the eight models are entirely proprietary and two are at least partly so, a 'request for proposal' is the best way to develop an appropriate study tool. An appendix contains a list of models investigated.

PB80-172240 PC **A04**/MF **A01**
Urban Inst., Washington, DC.
Sectoral Dynamics in Urban Housing: A Feasibility Study.
A. Thomas King, and C. Duncan MacRae. Sep 78, 70p HUD-0000775
Contract HUD-H-2162R

Data from Portland, Oreg., from 1960 to 1970 are used to test the ability of a dynamic sectoral model to simulate urban housing markets. The results are compared to those of the Urban Institute (UI) housing model and to actual data, where available. Initial results indicate that the value of agricultural land rent that best explains total residential land use, found by calibration, agreed with the actual land use not only in the aggregate but by zone as well. The model, however, indicated no change in agricultural land rents over the course of the decade. More extensive data collection is needed to obtain independent estimates of this variable. The model also indicated the rise in the price of land in the central city and the housing price differentials between city and suburb. However, neither this model nor the UI model indicated price variances among zones, signifying the importance of incorporating neighborhood externalities in the specifications of housing demand. This model and the UI model also correctly simulated residential construction by zone. The temporal pattern of construction, however, does not correspond with the dates on residential building permits. The population component was not sufficiently accurate across zones, again indicating the need for additional work on the role of externalities in individual residential location decisions. Statistical tables and technical data augment the discussion. Footnotes are provided.

PB80-172257 PC **A05**/MF **A01**
Bureau of the Census, Washington, DC. Construction Statistics Div.
Characteristics of New Housing: 1975. Construction Reports.
Annual rept.,
Peter R. Ohs. Nov 76, 78p HUD-0000786

This statistical report gives data on new housing in the United States in 1975 -- an estimate of all new housing completed, number of privately owned one - family houses completed, privately owned multifamily housing completed, rental units completed, new one - family houses sold, and contractor - built houses started. Breakdowns give this data by region and by location inside or outside a Standard Metropolitan Statistical Area. Other tables give data on such characteristics as air - conditioning, appliances, bathrooms, bedrooms, exterior wall materials, fireplaces, and number of floors in the building. Closing costs, sales prices, down payments, and mortgage information are covered, as are the values of building lots. These statistics have been estimated from sample surveys and include information received through March 1976. Appendices explain the survey methodology and contain tables of standard error, a glossary of definitions, and the survey instrument. In 1975 an estimated 1,313,000 new housing units were built in the United States, with the South showing the greatest housing growth (522,000 units) and the North Central States the next greatest (308,000 units). Most of these were single - family homes (866,000). Of the 430,000 units in buildings with 2 or more units, 117,000 were for sale and 313,000 were rental units. Publicly owned housing accounted for only 16,000 units. The comparative data show that housing construction has declined from a peak of 2,033,000 units in 1973.

PB80-172265 PC **A05**/MF **A01**
Bureau of the Census, Washington, DC. Construction Statistics Div.
Characteristics of New Housing: 1976. Construction Reports.
Annual rept.
Jul 77, 81p HUD-0000787

This annual report on new housing provides statistics on selected financial and physical characteristics of new housing. Where possible, the statistics have been adjusted to account for survey nonresponse. This was usually done when the nonresponse rate was less than 25 percent. Organized into five major areas, the report examines new housing units completed, privately owned one - family houses completed, privately owned multifamily housing completed, new one - family houses sold, and contractor - built houses started. Monthly and annual data on new housing completion are given as well as statistics on various characteristics of completed, new one - family houses by purpose of construction. These statistics cover the United States as a whole, the four census regions, and locations inside and outside the Standard Metropolitan Statistical Areas (SMSA's). Statistics were compiled for such items as types of financing, number of bedrooms and bathrooms, type of heating system and type of heating fuel, number of stories, and square feet of floor area. For new one - family houses sold, statistics include houses sold under condominium arrangements. The statistics in this report are estimated from sample surveys and are subject to sampling variability as well as to errors of response and nonreporting. Appendices include a description of the survey, definitions, and survey questionnaires.

PB80-172273 PC **A05**/MF **A01**
Bureau of the Census, Washington, DC. Construction Statistics Div.
Characteristics of New Housing: 1977. Construction Reports.
Annual rept.
Aug 78, 84p HUD-0000788

Based on the Bureau of Census' 1977 Survey of Construction, statistics are provided on selected financial and physical characteristics of new housing for 1977. Data presented deal with (1) new housing units completed according to month and the year; (2) privately owned one - family houses completed according to the characteristics of the structures (air conditioning, number of bedrooms, fireplaces, etc.); (3) privately owned multifamily housing completed by selected physical characteristics of buildings having two units or more (number of floors, number of units per building, with or without air conditioning, and type of heating fuel); (4) new one - family houses sold by financial and physical characteristics, including single family houses sold under condominium arrangements; and (5) contractor - built houses started, according to financial characteristics, including custom - built houses. Statistics are estimated from sample sur-

ways and are subject to sampling variability and errors of response and nonreporting. Appendices provide a description of the survey, definitions, and survey questionnaires.

PB80-172281 PC **A08**/MF **A01**
Bureau of the Census, Washington, DC.
Characteristics of New One-Family Homes: 1972. Construction Reports.
Annual rept.
Aug 73, 163p HUD-0000789

Statistics on characteristics of new one - family homes in 1972 cover homes sold, contractor - built homes started, and all homes completed (built for sale, contractor - built, owner - built, and rental). Data are derived from a study begun in 1962 conducted jointly by the Bureau of the Census, Social and Economic Statistics Administration, U.S. Department of Commerce, and HUD. Characteristics include type of financing, number of square feet of floor area, number of bedrooms, number of bathrooms, type of foundation, number of fireplaces, number of stories, type of parking facility, type of exterior wall material, type of heating system, type of heating fuel, and presence of central air conditioning. Information on new housing units started and completed is for new, privately owned one - family homes inside and outside Standard Metropolitan Statistical Areas and in four regions (Northeast, North Central, South, and West). Information on new, privately owned one - family homes deals with new homes sold, contractor - built homes started, and owner - built homes started 1966 to 1971, and all new homes completed in 1971 and 1972. Data on new homes sold present sales price and related information; information on new homes for sale concerns the number and intended sales price of homes for sale at the end of each year. Data on contractor - built homes present contract price and related information for contractor - built homes started. The appendices give a description of the survey, definitions, and a sample questionnaire for the survey of housing starts and sales.

PB80-172299 PC **A08**/MF **A01**
Bureau of the Census, Washington, DC.
Characteristics of New One-Family Homes: 1973. Construction Reports.
Annual rept.,
Juliana Van Berkum. Jul 74, 163p HUD-0000790

This joint publication of the Bureau of the Census and HUD is the 11th in a series. The statistical tables give data on number of new homes sold and for sale, contractor - built homes, and owner - built and rental homes. There is also information on type of financing, number of square feet of floor area, number of bedrooms, number of bathrooms, number of fireplaces, number of stories, types of parking facilities, foundation materials, exterior wall materials, heating system, heating fuel, and whether or not the home has central air conditioning. Breakdowns give data on the number of units started and completed in the Northeast, North Central, Southern, and Western regions of the country and for homes built within and not within a Standard Metropolitan Statistical Area. Appendices explain the survey methodology and give a glossary of definitions. The number of new privately owned one - family homes started in the United States rose from about 779,000 in 1966 to 1,151,000 in 1971 and 1,309,000 in 1973, but dropped slightly to 1,132,000 in 1973. In 1973 there were 2,033,000 new housing units completed; 19,000 of these were publicly owned, 1,174,000 were single - family structures, and 840,000 were in buildings with 2 or more units.

PB80-172307 PC **A07**/MF **A01**
Bureau of the Census, Washington, DC. Construction Statistics Div.
Characteristics of New One-Family Homes: 1974. Construction Reports.
Annual rept.,
Juliana Van Berkum. Aug 75, 150p HUD-0000791

This is the 12th annual report in a series issued jointly by the Bureau of the Census and HUD. It is a compilation of 12 monthly reports giving data on new homes sold and for sale, contractor - built homes, and owner - built and rental homes. The statistical tables give information on type of financing, number of square feet of floor area, number of bedrooms, number of bathrooms, number of fireplaces, number of stories, types of parking facilities, foundation type, exterior wall materials, heating system, heating fuel, and whether or not the home has central air conditioning. Breakdowns are included for the Northeast, North Central, Southern, and Western regions of the country and for homes built within and not within a Standard Metropolitan Statistical Area. These statistics have been gathered through sample surveys and a variety of data sources and include information received through February 1975. There were approximately 1,707,000 new housing units started and completed in 1974, down from 2,033,000 in 1973. Of these 16,000 were publicly owned, 932,000 were privately owned single - family structures, and 760,000 were privately owned units in structures with 2 or more units. The South had 394,000 units completed; the North Central States, 217,000; the West, 190,000; and the Northeast, 131,000. Appendices explain the survey methodology and contain a glossary as well as the survey questionnaire.

PB80-174618 PC **A02**/MF **A01**
Louisiana State Univ., Baton Rouge. Center for Wetlands Resources.
Characteristics of the Louisiana Shrimp Fleet, 1978,
M. E. Sass, and K. S. Roberts. Dec 79, 16p LSU-TL-79-006, NOAA-80031206

Commercial fishermen landed a record 1.7 billion pounds of seafood in Louisiana during 1978. The 1978 shrimp fishery in Louisiana produced the largest shrimp landings and value in the country. Economic information on the large, valuable shrimp fishery is sparse. Concerns about the quality of estuarine habitat and the ability of the shrimp fishery to absorb additional investment and employment emphasize the need for information. The report compiles data on resident commercial shrimpers and their businesses.

PB80-174709 PC **A02**/MF **A01**
Louisiana State Univ., Baton Rouge. Center for Wetlands Resources.
Financial Aspects of Louisiana Shrimp Vessels, 1978,
K. J. Roberts, and M. E. Sass. Dec 79, 10p LSU-TL-79-007, NOAA-80031207

The excellent Louisiana shrimp harvests of 1977 and 1978 have brought increased interest in shrimp vessels as investment opportunities. There is a sparse information base on the financial condition of Louisiana shrimp vessels on which to measure change. This publication was developed from personal interviews of 129 operators or owners of shrimp vessels. The financial condition of shrimp vessels in 1978 may be hard to improve on as shrimp catches retreat from record levels, more vessels begin shrimping, and costs continue to increase.

PB80-175169 PC **E04**/MF **E04**
International Inst. for Applied Systems Analysis, Laxenburg (Austria).
GEM (Global Economic Model): An Interactive Simulation Model of the Global Economy,
Olaf Helmer, and Lutz Blencke. c1979, 78p RR-79-4

The model described, which is named 'GEM' (Global Economic Model), is a six-person interactive simulation model (or game) intended to generate intuitive insights into the economic interactions among six world regions over the next 50 years. Each player is responsible for manipulating the economy of one of these regions. To do so, he has to make resource allocation decisions (between sector inputs, capital investment, investment in R&D, and supplies to consumers and to government); in addition, he may trade commodities with the other five participants and conclude long-term agreements with them concerning trades, loans, investments, and technology transfer.

PB80-809536 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Economic Models, May, 1978-April, 1980 (Citations from the NTIS Data Base).
Rept. for May 78-Apr 80,
Jack Jones. Apr 80, 271p
Supersedes NTIS/PS-79/0446 and NTIS/PS-78/0441. See also 1964-March, 1974, NTIS/PS-75/407; April, 1974-April, 1975, NTIS/PS-75/406; April, 1975-April, 1977, NTIS/PS-78/0440; and May, 1977-April, 1978, NTIS/PS-79/0445.

Broad applications of economic models to specific economies and markets are included. The economic models are used in forecasting and planning for various industries and businesses, environmental research, and the development of natural resources. Mathematical programming, computer programming and theory are also included. (This updated bibliography contains 264 abstracts, 114 of which are new entries to the previous edition.)

PB80-928204 PC **E03**/MF **A01**
Central Intelligence Agency, Washington, DC.
China: The Continuing Search for a Modernization Strategy.
Research paper.
Apr 80, 29p ER-80-10248
Color illustrations reproduced in black and white. Paper copy also available on Standing Order, Deposit Account required. North American Continent price based on page count of individual documents; all others write for quote. This series offers a reduction in price as a Standing Order, PB80-928200.

For the past two years the fundamental problem for China's policy-makers has been deciding upon the means for transforming the world's largest underdeveloped country into a modern, industrialized state. Freed of the dominating influence of Mao Zedong in 1976, the Chinese leadership's first attempt at solutions was embodied in the 10-year draft plan (1976-85), unveiled in February, 1978. The plan was intended to lay the groundwork for eventually bringing about the four modernizations--of agriculture, industry, national defense, and science and technology. Although the new plan gave more prominence to developing agriculture than in the past, the plan's central focus on heavy industrial growth constituted a continuation of Chinese policies of the previous two decades. The most innovative element in the plan was China's unprecedented willingness to use massive imports of western equipment and technology in the development effort.

5D. History, Law, and Political Science

AD-A082 462/3 PC **A03**/MF **A01**
RAND Corp Santa Monica CA
Escalation Space and Assumptions about Enemy Motivations: Elements in Warning Assessments.
Interim rept.,
William M. Jones. Jan 80, 35p Rept no. RAND/N-1269-AF
Contract F49620-77-C-0023

Strategic warning may be viewed as contingently predicting an imminent, significant escalation of a confrontation. Warning of an imminent Soviet strategic nuclear attack is one of a large set of possible escalations, although of unique consequence. Confrontations and conflict may be characterized as a series of escalations and de-escalations by one or both sides, involving some six factors that cover the participants, the locale, the degree of superpower involvements, the superpower declaratory policies, the types of weapons in use, and the targets of the military violence. By locating these variables on each of these ladders at every juncture in a confrontation, the warning analyst can identify the various steps open to the enemy.

AD-A082 489/6 PC **A03**/MF **A01**
RAND Corp Santa Monica CA
Reflections on Territorial Defense.
Interim rept.,
Horst Mendershausen. Jan 80, 27p Rept no. RAND/N-1265-AF
Contract F49620-77-C-0023

A territorial defense posture is a system that (1) is defensive, unsuited to attack across borders and unlikely to be perceived as a threat by other states; (2) relies principally on latent rather than standing forces, involving many citizens; (3) relies on weap-

ons and technologies different in type and composition from those of intervention and bombardment systems; (4) relates the military resources of a society so closely to the defense of its own territory and institutions that it constrains the country's participation in an international military alliance, especially one that calls for an integration of alliance forces. A territorial defense doctrine goes with a military function or type of force that plays a greater or smaller role in a country's total military establishment, besides other functions or force types that have doctrines of their own. Aside from international political and strategic conditions, domestic political factors may increase forces in a country's military system. (Author)

AD-A082 835/0 PC **A02**/MF **A01**
Department of Defense Washington DC
Department of Defense Annual Report Fiscal Year 1980. Executive Summary,
Harold Brown. 25 Jan 79, 25p

Partial contents: The International Situation and Defense -- The Soviet Union, Goals, SALT, and International developments; The Military Balance -- Strategic concepts and Tests of effectiveness; and Vulnerabilities and needs.

PB80-176662 PC **A02**
Woods Hole Oceanographic Institution, MA. Marine Policy and Ocean Management Program.
The Common Heritage of Mankind,
Susan Peterson. Feb 80, 7p NOAA-80032103
Grant NA-79AA-D-00102
Pub. in Environment, v22 n1 p6-11 Feb 80.

Domestic actions and international agreements related to man's use of the ocean grow more protective each year as our ability and need to exploit ocean resources expand. The best example of this is the current Law of the Sea (LOS) negotiations. The LOS negotiations in this decade are an attempt to redefine ocean law, determine new balances, adjust for past inequities, and provide a future ocean regime free from the domination of a single country or interest group.

PB80-809502 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Citizen Participation in Local Government. 1974-1978 (Citations from the NTIS Data Base).
Rept. for 1974-78,
Edith Kenton. May 80, 340p

This bibliography contains citations discussing administration of health care, water resources, human services, coastal zones, community affairs, recreational facilities, criminal justice and crime prevention programs, economic advancement, roads and traffic control, communications, regional transportation, and public policies. (This bibliography contains 333 abstracts, none of which are new entries to the previous edition.)

PB80-809510 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Citizen Participation in Local Government. 1979-April, 1980 (Citations from the NTIS Data Base).
Rept. for 1979-Apr 80,
Edith Kenton. May 80, 100p
Supersedes NTIS/PS-79/0431 and NTIS/PS-78/0422. See also 1964-1973, NTIS/PS-77/0377 and 1974-1978, PB80-809502.

This bibliography contains citations discussing administration of health care, water resources, human services, coastal zones, community affairs, recreational facilities, criminal justice and crime prevention programs, economic advancement, roads and traffic control, communications, regional transportation, and public policies. (This bibliography contains 94 abstracts, 61 of which are new entries to the previous edition.)

PB80-923300 Subscription
Library of Congress, Washington, DC. American Law Div.
Election Case Law and Election Law Updates.
Quarterly repts.
1980, 8 issues
Supersedes NTISUB/E/233. Sponsored in part by National Clearinghouse on Election Administration, Washington, DC.
Paper copy available on subscription, North American Continent price $45.00/year; all others write for quote. Subscription provides quarterly two separate reports; 'Election Case Law' and 'Election Law Updates'.

Federal and state elections legislation, litigation and related state opinions are synopsized in this quarterly survey. Report is divided into state by state legislation and litigation, state attorney's general opinions, and Federal legislation and litigation sections. A comprehensive subject index is also included.

PB80-923400 Subscription
Library of Congress, Washington, DC. American Law Div.
Federal-State Election Law Updates: An Analysis of State and Federal Legislation.
Quarterly repts.
1980, 4 issues
Supersedes NTISUB/E/234.Sponsored in part by National Clearinghouse on Election Administration, Washington, DC.
Paper copy available on subscription, North American Continent price $30.00/year; all others write for quote. Also available in single copies.

Federal and State elections legislation, litigation and related state opinions are synopsized in this quarterly survey. This includes elections information compiled during the January 1, 1979-March 31, 1980 time period. Report is divided into state by state legislation, state attorney's general opinions, and Federal legislation sections. A comprehensive subject index is also included.

PB80-923500 Subscription
Library of Congress, Washington, DC. American Law Div.
Election Case Law: An Analysis of Recent Supreme Court, Federal Court, and State Court Decisions.
1980, 4 issues
Supersedes NTISUB/E/235. Sponsored in part by National Clearinghouse on Election Administration, Washington, DC.
Paper copy available on subscription, North American Continent price $30.00/year; all others write for quote. Also available in single copies.

Federal and State litigation are synopsized in the quarterly survey. The edition includes Federal and State case decisions during January, 1980-March, 1980 time period. The report is divided into Election subjects and includes a comprehensive index.

5E. Human Factors Engineering

AD-A082 705/5 PC **A05**/MF **A01**
Naval Ocean Systems Center San Diego CA
Human Engineering Principles Applied to a Laboratory Development Model: A Demonstration.
Technical document,
J. Rhode, B. Simonson, J. Stacy, and B. Foulke.
22 May 79, 76p Rept no. NOSC/TD-307

Development of complex and technically sophisticated electronic equipment for use aboard ship often proceeds from concept to prototype with little or no consideration of human factors. The introduction of the human operator to the system at the production stage results in requirements for human factors modifications to be retrofit into system designs. An evaluation of the human factors of a laboratory model of a system (Integrated Calibration and Test System) was made to illustrate some of the human design factors to system design engineers and to show that human engineering design should begin early in system developments. (Author)

N80-21033/9 PC **A07**/MF **A01**
Virginia Univ., Charlottesville. Dept. of Civil Engineering.
Human Comfort Response to Dominant Random Motions in Longitudinal Modes of Aircraft Motion.
R. W. Stone, Jr. Jan 80, 130p NASA-CR-159186, UVA/528156/MAE-CE79/130
Contract NAS1-14908

The effects of random vertical and longitudinal accelerations and pitching velocity passenger ride comfort responses were examined on the NASA Langley Visual Motion Simulator. Effects of power spectral density shape were studied for motions where the peak was between 0 and 2 Hz. The subjective rating data and the physical motion data obtained are presented without interpretation or detailed analysis. There existed motions in all other degrees of freedom as well as the particular pair of longitudinal airplane motions studied. These unwanted motions, caused by the characteristics of the simulator may have introduced some interactive effects on passenger responses.

N80-21034/7 PC **A05**/MF **A01**
Virginia Univ., Charlottesville. Dept. of Civil Engineering.
Human Comfort Response to Random Motions with a Dominant Pitching Motion.
R. W. Stone, Jr.. Feb 80, 94p NASA-CR-159140, UVA/528156/MAE-CE79/117
Contract NAS1-14908

The effects of random pitching velocities on passenger ride comfort response were examined on the NASA Langley Visual Motion Simulator. The effects of power spectral density shape and frequency ranges from 0 to 2 Hz were studied. The subjective rating data and the physical motion data obtained are presented. No attempt at interpretation or detailed analysis of the data is made. Motions in all degrees of freedom existed as well as the intended pitching motion, because of the characteristics of the simulator. These unwanted motions may have introduced some interactive effects on passenger responses which should be considered in any analysis of the data.

PB80-171895 MF **A01**
Syracuse Univ., NY.
Barrier-Free Design.
Selected bibliography,
Apr 79, 19p HUD-0000667, HUD/PDR-400
Contract HUD-H-2200
Paper copy available from the Sup. of Docs., Stock number 023-000-00512-3.

Consisting primarily of planning and design materials, this annotated bibliography provides information on making buildings accessible to the physically handicapped. One of a series of 6 documents on the subject of barrier - free design for the physically handicapped, this bibliography contains 126 citations, all of which are annotated. The main focus of the bibliography is on fundamental design and planning of buildings and landscaping. The entries were selected from the fields of gerontology and general behavioral sciences, and they include research reports, reviews of government activities, guidebooks on design of buildings and facilities, handbooks for simplifying daily activities, and general behavioral issues related to barrier - free design. Most of the documents are well illustrated and comprehensive, are easy to obtain, or have information that cannot be obtained elsewhere. The publications are dated between 1953 and 1978. A topic index is provided.

PB80-171903 PC **A02**/MF **A01**
Syracuse Univ., NY.
Proposed Revisions to the HUD Minimum Property Standards.
Apr 79, 12p HUD-0000668, HUD/PDR-401
Contract HUD-H-2200

Specific revisions to HUD's Minimum Property Standards (MPS) are discussed with reference to the American National Standards Institute's (ANSI) barrier - free design standards for the handicapped. These revisions address the availability of accessible buildings in housing for the elderly and handicapped, multifamily housing, and single - family housing. The 14 recommendations discussed include the following basic suggestions: adopt the proposed ANSI A117.1 (1977) by reference in the MPS for multifamily housing; establish a minimum number of accessible units in multifamily housing and allow regional HUD offices to establish a higher number based on local need and demand; prepare minor revisions to the MPS criteria that would restrict accessibility or cause increased costs, if accessibility criteria in ANSI were referenced; prepare a guidebook for design of accessible housing; and prepare guidelines for establishing the need for accessible housing at the local level. Specific recommendations suggest the

deletion of the requirement for a desk in the bedroom of one - bedroom apartments for the elderly since the desk would require an unnecessary increase in floor space in the bedroom beyond that required in the table of minimum floor areas for rooms, and an exception to the MPS prohibition against stairs as the only means of access to dwelling units for the elderly since many elderly people are able to walk stairs easily.

5F. Humanities

PB80-169451 PC **A08**/MF **A01**
North Carolina Univ. at Wilmington. Marine Science Fund.
Excavations at 31 On v 33: A Late Woodland Seasonal Village.
Final rept.,
Thomas C. Loftfield. Dec 79, 157p
Contract HCRS-C5558(78)

This paper reports on archaeological excavations conducted at 31 Onv33, a site of predominantly late Woodland cultural affiliation located on the central coast of North Carolina. Analysis of artifacts, ethnobotanical materials, faunal materials, and shellfish remains, and the village structure itself suggest a late spring/early summer period of occupation, which supports a hypothesized seasonal adaptive cycle for this region that includes a dispersal to the shores of estuaries of this time of year. Features and post molds were plotted and excavated, providing not only cultural debris for analysis but also information on the village itself. One complete house pattern was discernible, and half of another became apparent during the analysis. These are the first house patterns discovered on the coast of North Carolina. Several other lines of post molds could not be associated with recognizable structures.

5G. Linguistics

AD-A082 847/5 PC **A02**/MF **A01**
Princeton Univ NJ Dept of Statistics
An Induction Theorem for Discovering Syntactic Translations.
Technical rept.,
Philip R. Thrift. Jan 80, 19p Rept no. TR-160-SER-2
Contract N00014-79-C-0322

Given an input-output sequence of syntactic translations of sentences generated by a deterministic finite state grammar G into Sigma*, a method is given for discovering the function which maps productions of G into Sigma* that gives rise to the observed translation. (Author)

5H. Man-Machine Relations

AD-A082 620/6 PC **A03**/MF **A01**
Perception Technology Corp Winchester MA
Continuously Automatic Speaker Adaptation.
Final technical rept. Jul 78-Aug 79,
Leon Ferber, Huseyin Yilmaz, Henry Kellett, and Alex Doohovskoy. Jan 80, 48p RADC-TR-79-349
Contract F30602-78-C-0243

An exploratory development model was implemented and a gisting scenario was devised utilizing a 50-word vocabulary simulating an air traffic control environment. The gisting scenario is an on-line voice-controlled program for the creation, appending and editing of gisting files while an operator is monitoring an air traffic control channel by means of a headset. Recognition results were obtained on the 50-word vocabulary which included ten connected digits plus control words and descriptors simulating the air traffic control environment. The vocabularies were subdivided in the manner of their use in the gisting scenario with fewer than 24 vocabulary words active at any time. A voice-operated DISABLE/ENABLE facility was provided to prevent the entry of irrelevant conversation into the gisting algorithm. Although real-time recognition was not fully achieved, on-line performance was successfully demonstrated and high recognition accuracy obtained over the entire 50-word vocabulary. (Author)

N80-21055/2 PC **A07**/MF **A01**
Technische Univ., Berlin (Germany, F.R.). Inst. fuer Luft- und Raumfahrt.
Improvement of a Process to Identify the Parameters for the Optimal Control Model (Bbn) Entwicklung Eines Verfahrens Zur Identifikation der Parameter des Bbn-Modells.
U. Kirchhoff. 1978, 146p ILR-40, ISBN-3-79830-657-5
Text in German.

A description and mathematical representation of the functions of the optimal control model in time, and considering the limits of speed and vibration of the vehicle are given. The model must reproduce the structure of the model, different processes were adopted to obtain the parameters for the signal transmission, namely dead time, the time constant for the delay of neuromuscular action, and also the input signals from the ground which have been amplified by an optical regulator and a Kalman filter.

PAT-APPL-6-089 826 PC **A02**/MF **A01**
Department of the Army Washington DC
Touch Screen Target Designator.
Patent Application,
Robert B. Ottesen, and Gerald L. Morris. Filed 31 Oct 79, 10p AD-D007 107/6
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

The touch screen target designator allows an operator observing targets imaged on a display device to merely touch the desired target on the imaging display to instantaneously (millisecond delay) position the courser symbology to that point for tracking designation. This union of a touch screen with an imaging tracker working from real world images allows real time selection of specific, recognizable objects from the field of view for processing or tracking. This greatly simplifies and speeds both still and moving target designation since a finger touch is all that is required to designate a target. It reduces the number of moving parts, such as a joy stick, and eliminates the umbilical connection external to the image, such as a light pen device.

5I. Personnel Selection, Training, and Evaluation

AD-A082 454/0 PC **A04**/MF **A01**
Pennsylvania Emergency Management Agency Harrisburg
The Development of the Emergency Management Coordinator's Handbook.
Final rept. 1 Sep 78-28 Feb 80,
Donald F. Taylor, William F. Karl, and Hope R. Emerich. Feb 80, 63p
Contract DCPA01-78-C-0260

The Emergency Management Coordinators' handbook was developed to provide guidance to county and local emergency management coordinators with respect to all aspects of job performance. The manual was developed using systems analysis techniques. The job of emergency management coordinator was reviewed from a systems standpoint. In writing this manual, the total environment in which today's emergency management coordinator functions was taken into consideration. This included political climate, technological considerations, finding limitations and public opinion ramifications. A system was developed which separated the job of the emergency management coordinator into 40 specific tasks. A research project was planned, developed and initiated which resulted in assembling information, assigning performance objectives and developing a recommended test method for each task. A study was planned and developed and then undertaken to provide information on and from the local emergency management coordinators. The similarities of rural and urban counties having full-time, part-time and volunteer emergency management coordinators whose emergency management programs were at varying stages of development. Based on the information gathered through these studies, the manual was developed to provide these coordinators with rapid access to information in the following five areas: (1) Leadership, (2) Training, (3) Plans, (4) Operations, and (5) Administration.

AD-A082 490/4 PC **A04**/MF **A01**
RAND Corp Santa Monica CA
DOD Standards for ROTC Efficiency.
Interim rept.,
Polly Carpenter-Huffman, and William McNaught. Jun 79, 61p Rept no. RAND/N-1002-1-MRAL
Contracts F49620-77-C-0023, MDA903-77-C-0108

An examination of the relation to efficiency of current Department of Defense (DoD) standards for Reserve Officer Training Corps (ROTC) detachments. This work, part of a larger study of ROTC management, was undertaken in response to a congressional request to the Office of the Secretary of Defense (Manpower, Reserve Affairs, and Logistics). After describing the current standards and the reasons for the request, the authors discuss measures of efficiency and show that the current standard fails to single out some inefficient units and discriminates against some that are efficient. Additional analyses lead the authors to the conclusion that criteria for detachment viability should deal with several measures of efficiency, rather than with a single measure, as does the current standard. They recommend that the military Services specify measures of ROTC participant quality and improve their ROTC management data in other ways. The note discusses further research that will be conducted for this study. (Author)

AD-A082 531/5 PC **A09**/MF **A01**
Human Resources Research Organization Alexandria VA
Program Management for Tank Crewman Skills Training Program.
Research product,
Richard E. O'Brien, and William J. Crum. Nov 79, 186p HUMRRO-RP-WD(KY)-79-14, ARI-RP-79-16
Contract DAHC19-76-C-0001
See also Rept. nos. RP-79-13, AD-A082 569, RP-79-14, AD-A082 686 and RP-79-15, AD-A082 706.

This document explains the development of the Tank Crewman Skills Training Program and provides guidelines for managing the program. General developmental procedures for diagnostic testing and remedial training are given first. Remaining sections of the report give detailed program management guidance for training managers and trainers about training responsibilities, required training resources, administering readiness tests and training modules, and maintenance of training records. When used with three companion documents, Tank Crewman (M60A1) Readiness Tests, Tank Crewman (M60A1) Training Modules, and Tank Crew (M60A1) Performance Exercise, the program management for tank crewman skills training program provides guidance for implementing an integrated 'train-up' package for annual gunnery evaluation. (Author)

AD-A082 532/3 PC **A10**/MF **A01**
Market Facts Inc Washington DC Public Sector Research Group
Youth Attitude Tracking Study; Fall 1979.
Survey rept.
Mar 80, 210p
Contract MDA903-78-C-0396

There are a number of factors that are related to a young man's decision to enlist in a military service. Factors such as national unemployment and regional cultural environments can have a strong bearing upon enlistment. Other factors related to enlistment behavior include youth's general attitudes concerning military service and their awareness of the opportunities provided by the services. The information gathered in each of the nine waves of this study has three fundamental objectives. The first objective is to gather information that has common utility for all the military services. Secondly, twenty-six special recruiting areas have been isolated throughout the country so that special analyses can be performed on each of them. These areas, referred to as Tracking Areas, comprise one or more geographic units of each of the services: Recruiting Detachments (Squadrons) (Air Force), District Recruiting Commands (Army), Recruiting Stations (Marine Corps), and Recruiting Districts (Navy). Each service is able to track the study variables over time within actionable geographic areas defined by recruiting boundaries of each service. Thirdly, the study is designed to provide observations over time so that changes in attitudes and behavior can be detected and ap-

praised, and recruiting strategies modified accordingly.

AD-A082 551/3 PC **A04**/MF **A01**
Texas Tech Univ Lubbock Inst for Biotechnology
Establishing Criteria for Assigning Personnel to Air Force Jobs.
Progress rept. 1 Oct 78-30 Sep 79,
M. M. Ayoub, N. J. Bethea, J. D. Denardo, B. Duran, and B. K. Lambert. 30 Nov 79, 58p
AFOSR-TR-80-0226
Contract F49620-79-C-0006

Primary efforts during the first year were focused on the initial job analysis phase of the project. In this phase each Air Force Specialty Code (AFSC) is surveyed to identify the tasks which require significant physical demands. These tasks are quantified, using an appropriate physical unit through the use of task analysis, such that an accurate assessment of demands can be made. From this list of tasks for each AFSC, a set of tasks known as Performance Criteria Tasks (PCTs) will be selected. An individual's performance on these PCTs, then, will determine whether or not the individual is successful or not in performing the physically demanding tasks within the AFSC. This report discusses the questionnaires developed for the field surveys to be conducted, the rationale and sampling scheme used for the selection of tasks, the preliminary questionnaire used in the field survey of the initial 45 AFSCs, and the basic questionnaire to be used on the accompanying follow-up survey.

AD-A082 569/5 PC **A14**/MF **A01**
Human Resources Research Organization Alexandria VA
Tank Crewman (M60A1) Readiness Tests.
Research product rept.,
Richard E. O'Brien, James H. Harris, William C. Osborn, and Richard D. Healy. Nov 79, 307p
HUMRRO-RP-WD(KY)-79-11, ARI-RP-79-13
Contract DAHC19-76-C-0001

This document provides tests and administrative guidance for evaluating M60A1 tank crewman job readiness. General procedures, time estimates, and support equipment for using the tests in a unit setting are given first. Remaining sections of the report give detailed test administration and scoring procedures for the crew positions, driver, loader, gunner, and tank commander. The tests cover knowledge and skill aspects of the important crewman tasks: those tasks that are most relevant to crew gunnery proficiency. The tests are designed for use by the unit commander in diagnosing crewmen abilities in conducting before-operations checks, disassembling and assembling weapons, and driving, loading, and shooting in a tactical setting. When used with the three companion documents, Tank Crewman (M60A1) Training Modules, Tank Crew (M60A1) Performance Exercise, and Program Management for a Tank Crewman Skills Training Program, the readiness tests provide an integrated 'train-up' package for annual gunnery evaluation. (Author)

AD-A082 570/3 PC **A03**/MF **A01**
Air Force Academy CO Library
Integrity of Higher Education,
Betsy C. Kysely, and Cyd Spreier. Mar 80, 28p
Rept no. SPECIAL BIB SER-61

This bibliography was prepared for the Department of Political Science to assist participants in the 22nd Air Force Academy Assembly to be held at the Academy on 11-15 March 1980. It represents a selected portion of the Air Force Academy Library's holdings on the topic, integrity of higher education.

AD-A082 611/5 PC **A15**/MF **A01**
Assistant Secretary of Defense (Manpower Reserve Affairs and Logistics) Washington DC
Manpower Requirements Report for FY 1981.
Feb 80, 331p

Contents: Manpower and U.S. National Security; Summary of Requirements; Military Forces and Defense Manpower; Army Manpower Requirements; Navy Manpower Requirements; Marine Corps Manpower Requirements; Air Force Manpower Requirements; Defense Agencies Manpower Requirements; Cost of Manpower; All-Volunteer Force; Women in the Military; Productivity; Manpower and Forces by Location; and Manpower Data Structure.

AD-A082 621/4 PC **A03**/MF **A01**
RAND Corp Santa Monica CA
DoD Survey of Officers and Enlisted Personnel (1978). Sample Design and Selection.
Interim rept.,
W. P. Hutzler, and Z. D. Doering. Feb 80, 40p
Rept no. RAND/N-1453-MRAL
Contract MDA903-77-C-0108

Since 1969, the Department of Defense has conducted large-scale surveys of military personnel at approximately two-year intervals. These surveys, administered across Services, have measured the attitudes of military personnel toward a number of DoD programs and policies. This note describes the sampling plan and selection process that Rand developed for the administration of the 1978 DoD Survey of Officers and Enlisted Personnel. Recommendations are given for the development by the Army, Navy, and Marine Corps of a sampling capability that interfaces with central personnel files and a survey capability integrated into the personnel organizations of those Services, i.e., a system similar to that of the Air Force. (Author)

AD-A082 627/1 PC **A07**/MF **A01**
Southeastern Center for Electrical Engineering Education Inc Orlando FL
1979 USAF/SCEEE Summer Faculty Research Program.
Final rept. 7 Dec 78-30 Sep 79,
Richard N. Miller. Dec 79, 127p AFOSR-TR-80-0246
Contract F49620-79-C-0038

In the 1979 USAF-SFRP seventy appointments were made to faculty members across the U.S. by SCEEE. These professors were assigned to twenty-three USAF laboratories, centers and divisions ranging in location from California to Massachusetts. The 1979 ten-week Summer Faculty Program began in June 1979. Each participant in the program was a member of the faculty of an accredited university department in a subject area appropriate to the research he/she worked on at the host laboratory/center. This document is an administrative summary of the efforts of the 1979 SFRP. Participant as well as sponsor evaluations of the program are reported. The Administrative Report also includes abstracts of the final technical reports. (Author)

AD-A082 686/7 PC **A11**/MF **A01**
Human Resources Research Organization Alexandria VA
Tank Crewman (M60A1) Training Modules.
Research product rept.,
Richard E. O'Brien, James H. Harris, William C. Osborn, and Richard D. Healy. Nov 79, 235p
HUMRRO-RP-WD(KY)-79-12, ARI-RP-79-14
Contract DAHC19-76-C-0001

This document provides training outlines and administrative guidance for promoting M60A1 tank crewman readiness. Administrative guidance, time estimates and equipment requirements for training are given first. Remaining sections of the report are detailed outlines of training for the crew positions, driver, loader, gunner, and tank commander. The training outlines address knowledge and skill aspects of the important crewman tasks: those tasks that are most relevant to crew gunnery proficiency. The training is designed for use by the unit commander in promoting proficiency in the conduct of before-operations checks, disassembling and assembling weapons, and driving, loading, and shooting in a tactical setting. When used with three companion documents, Tank Crewman (M60A1) Readiness Tests, Tank Crew (M60A1) Performance Exercise, and Program Management for a Tank Crewman Skills Training Program, the module outlines provide and integrated 'train-up' package for annual gunnery evaluation. (Author)

AD-A082 706/3 PC **A07**/MF **A01**
Human Resources Research Organization Alexandria VA
Tank Crew (M60A1) Performance Exercise.
Research product rept.,
Richard E. O'Brien, James H. Harris, William C. Osborn, and Richard D. Healy. Nov 79, 129p
HUMRRO-RP-WD(KY)-79-13, ARI-RP-79-15
Contract DAHC19-76-C-0001

This document provides test exercises and administrative guidance for evaluating the readiness of M60A1 tank crews. Administrative guidance and equipment requirements for crew testing are given first. Remaining sections of the report present crew performance exercises for Preparation for Operations, and for Tactical Operations. The Crew Performance exercise is designed for use by unit commanders in assessing mastery of tasks requiring interaction by crew members. When used with three companion documents, Tank Crewman (M60A1) Readiness Tests, Tank Crewman (M60A1) Training Modules, and Program Management for a Tank Crewman Skills Training Program, the crew performance exercise provides an integrated 'train-up' package for annual gunnery evaluation. (Author)

AD-A082 707/1 PC **A07**/MF **A01**
Human Resources Research Organization Alexandria VA
Development of a Methodology for Measuring Transfer of Training Effects for Tactical Training Systems.
Final rept. Oct 78-Sep 79,
Howard G. Hill, and Gary Kress. Sep 79, 137p
ARI-RN-80-6
Contract MDA903-78-C-2042

A methodology for the measurement of transfer of training between a battle simulation (Dunn-Kempf) and a tactical field exercise (REALTRAIN) was developed. The methodology is based on evaluation of tactical performance in company level combined arms exercises (offensive mission) in both training environments. This report documents the development, tryout, and refinement of a tactical performance evaluation instrument and discusses the development and use of an evaluator training program. Attached to the report is research plan for determining the reliability of measurement for the instrument developed during this study and for conducting a transfer of training experiment between Dunn-Kempf training exercises and REALTRAIN field exercises. The report and the performance evaluation instrument have application for evaluating the effectiveness of tactical training for Company/Team leaders. (Author)

AD-A082 730/3 PC **A03**/MF **A01**
Kinton Inc Alexandria VA
Development of a Leader Training Model and System.
Research note,
Edgar L. Shriver, Kermit F. Henriksen, Donald R. Jones, Jr., and Peter W. J. Onoszko. Jan 80, 37p
ARI-RN-80-3
Contract MDA903-78-C-2005

The objective of this effort was to develop a preliminary theoretical model specifying the nature and sequencing of training for leaders in an engagement simulation environment. An interaction training model and system (squad through company level) with three distinct learning processes--experiential, analytic, and procedural--was developed. The model addresses identified leader skills and different levels of simulation of training. The system further specifies administrative and logistical procedures for conducting training. (Author)

AD-A082 738/6 PC **A06**/MF **A01**
Carnegie-Mellon Univ Pittsburgh PA
Department of the Navy EEO Internal Recruitment Study.
Technical rept.,
Denise Nitterhouse. 30 Sep 79, 106p OASN(M/RA/L)-RR-36
Contract N00014-76-C-0932

This study was performed to determine how the Department of the Navy has used internal recruitment for Civilian employees during the 1972 to 1978 period and how it can use internal recruitment in the future as a tool for improving the representation of race/national origin and sex groups currently under-represented in some areas of its workforce. The analytic approach used was developed as part of the study to provide a prototype for further analyses in connection with the Navy's participation in the Federal Equal Opportunity Recruitment Program (FEORP). Recommendations for Department-wide Internal Recruitment were based

on the analysis of historical data and examination of entry requirements for various occupations and grade groups. (Author)

AD-A082 817/8 PC **A03**/MF **A01**
Army Research Inst for the Behavioral and Social Sciences Alexandria VA
Development and Evaluation of a Simple Job Performance Aid for M151A1, A2 Truck Operators.
Research rept.,
David L. Ryan-Jones. Nov 79, 39p Rept no. ARI-RR-1230

This report describes the development and evaluation of a prototype job performance aid for M151A1, A2 truck operators. The job performance aid was formatted as a checklist and was derived from a consolidation of operator checks describing the standards of maintenance on the vehicle for the operator and his supervisor. The job performance aid was evaluated in comparison to the operator's technical manual (TM 9-2320-218-10, August 1978). Twenty soldiers were randomly assigned to the job performance aid condition or the technical manual condition, and to one of two vehicles. Each soldier inspected a vehicle using the performance aid or the technical manual, and performance was assessed in terms of the percent of faults found by the soldier in relation to the actual number of faults on the vehicle. Using the job performance aid resulted in better performance than using the technical manual in terms of the percent of faults found (29.8% vs. 10.2%). (Author)

AD-A082 916/8 PC **A03**/MF **A01**
Army Research Inst for the Behavioral and Social Sciences Alexandria VA
Early Training Assessment within Developing System Concepts.
Research rept. Nov 78-May 79,
Charles C. Jorgensen. Aug 79, 47p Rept no. ARI-RR-1224

This paper presents a proposal for training assessment within early system concepts. A broad spectrum of training requirements generated by recent Army guidance for determining training impacts at the earliest stages of weapon system specification is considered. An examination of the state of the art is made along with recommendations for six methodological areas: concept generation, task specification, trade-off analysis, management information, system effectiveness estimation, and costing. Innovative and little known techniques discussed include both tri-service and foreign research. A proposal is made for combinations and extensions of existing research to meet projected Army needs. Areas in need of further research are identified. (Author)

AD-A082 922/6 PC **A09**/MF **A01**
Litton Mellonics Systems Development Div Springfield VA
Alternative Models for Individualized Armor Training. Part I. Interim Report: Review and Analysis of the Literature.
Rept. for 30 Mar-30 Oct 79,
Richard K. Matlick, Robert W. Swezey, and Kenneth I. Epstein. Jan 80, 182p ARI-RN-80-1
Contract MDA903-79-C-0331

This report presents a review and analysis of literature pertaining to individual and/or self-paced instruction in educational, industrial, and military settings. It describes the major types of individualized or self-paced instructional systems that have been investigated or implemented, and it examines eight factors which vary among applications of methods of individualized instruction and which are held to strongly influence the feasibility of methods for any given instructional environment (context). The eight controlling factors examined are: (1) time available/required for learning; (2) instructional personnel; (3) facilities; (4) management; (5) student populations/learner characteristics; (6) course content/task types; (7) instructional methods; and (8) media, materials, and devices. The review includes an examination of conceptual models of individualized instruction and the classification of those models. Generally, it shows that most established systems of individualized instruction are similar in terms of fundamental models and that many fundamental models are not represented by existing systems.

AD-A082 923/4 PC **A03**/MF **A01**
Seville Research Corp Pensacola FL
A Field Evaluation of the UH1FS Instructor's Guide.
Letter rept. Sep 78-Mar 79,
Robert N. Isley, and Edward J. Miller. Aug 79, 33p SEVILLE-TR-79-01, ARI-RR-1221
Contract DAHC19-77-C-0039

This report describes a small-scale field evaluation of the UH1FS Instructor's Guide. The Guide was developed for use by instrument instructor pilots at UH-1H flight simulator (UH1FS) field locations. The Guide was designed to serve (a) as an information source or textbook for instructor pilots learning to conduct training in the UH1FS and (b) as a job aid or reference for use during training. The field evaluation was conducted to determine how well the Guide functioned as a job aid and to develop guidance necessary for preparing similar instructor guides for future Army flight simulators. UH1FS instructors at two field locations were given draft copies of the Guide. In-depth instructor interviews were conducted after the instructors has used the Guide for about 3 months. Instructor comments on the usefulness of the Guide are summarized in the report. Instructors found the Guide satisfactory in all important respects. (Author)

AD-A082 940/8 PC **A09**/MF **A01**
Assistant Secretary of Defense (Manpower Reserve Affairs and Logistics) Washington DC
Manpower Requirements Report for FY 1981. Base Structure Annex.
Jan 80, 188p

This Annex contains a report on the DoD base structure associated with the forces and personnel levels included in the President's Budget for FY 1981. The Annex has been prepared with the intent of providing an understanding of the scope, size and purpose of the base structure as it exists at the present time. The base structure is identified in this report by Military Service and regionally, by bases in the Fifty States, U.S. Territories and Possessions and foreign overseas areas. Listed in the report are installations and activities which can be directly related to the force levels of the Military Services. Installations have been categorized and are discussed on the basis of their primary mission. The categorization of installations is based upon a classification system developed for this report and discussed in the FY 1978 Base Structure Annex. Base operations costs for each Service, as compiled from the DoD budget process, are also identified together with an explanation of actions being taken by the Defense Department to reduce such costs. Proposed actions which affect the base structure and base operations cost are also highlighted and discussed.

AD-A082 953/1 MF **A01**
Human Resources Research Organization Alexandria VA
Survey of Army Weapons Training and Weapons Training Devices.
Research memo.,
Michael R. McCluskey, Donald F. Haggard, and Theodore R. Powers. Apr 76, 546p ARI-RM-76-8
Contract DAHC19-73-C-0057
Availability: Microfiche copies only.

The overall goal is to provide information concerning the most effective and efficient methods of training Army personnel to required levels of proficiency in weapons firing. The examination of training methods will focus on the contribution of training devices and live firing to weapons proficiency. This task consisted of surveying current Army weapons training. The basic information collected for the surveys was contributed by numerous groups and agencies at each of the combat arms schools. Traditionally, training in the use of military weapons has been conducted by lecture, demonstrations, and practice in live firing the actual weapons on ranges possessing the necessary area requirements. However, numerous factors place serious constraints on the use of live firing. Furthermore, costs incidental to live firing place constraints on training effectiveness. Accordingly, efforts are being made to perfect techniques and devices which will enable development of weapons proficiency with a minimum, or at least optimum, use of live firing practice. It is also important to determine whether required proficiency levels can be achieved through more extensive use of new training techniques and devices, or through substitution, in whole or in part, of the techniques and devices for live firing in weapons training.

AD-A082 954/9 PC **A03**/MF **A01**
American Inst for Research Washington DC
Evaluation of Two Tank Gunnery Trainers.
Research memo.,
Andrew M. Rose, George R. Wheaton, Russell L. Leonard, Jr., Paul W. Fingerman, and G. Gary Boycan. Aug 76, 34p ARI-RM-76-19
Contract DAHC19-73-C-0049

The purpose of this experiment was to evaluate the training effectiveness of two tank gunnery training systems. An additional goal was to determine the level of proficiency which students should reach on the device in order to maximize initial (12-shot) transfer on the main gun. The basic approach was to select students who, while having had classroom sessions on main-gun firing and adjustment-of-fire procedures, has not had any practice on the actual tasks. Individual students within several experimental groups then practiced tracking and firing until a predetermined proficiency level was achieved. Following training, each experimental student tracked and fired for a total of 12 main-gun rounds. An additional control group also tracked and fired 12 rounds; however, they did not have the benefit or prior training.

AD-A082 955/6 MF **A01**
Human Resources Research Organization Alexandria VA
Task Analyses of Three Selected Weapons Systems.
Research memo.,
Theodore R. Powers, and Michael R. McCluskey. Oct 76, 100p ARI-RM-76-20
Contract DAHC19-73-C-0057
Availability: Microfiche copies only.

This research is part of a broader program on simulation. Training simulators reduce demands on limited resources and promise greater efficiency in both training and testing; however, no experimental evidence has compared performance resulting from simulator vs. live-fire training. The overall objective of this project was to determine the contribution of live firing of large caliber weapons to weapons proficiency. This study conducted task analyses to identify the critical performance requirements for three selected weapons systems, and to identify the commonalities and differences in tasks within the three major weapons systems and other weapons of a similar but somewhat different nature. The three weapons used were: The M60A1 Tank and its 105mm main gun; The 155mm Howitizer--Self propelled; and The 81mm Mortar. Among the topics included are: identification of mission profiles, development of task inventories, administration of the task inventories to job incumbents, and analyses of the results.

AD-A082 966/3 PC **A03**/MF **A01**
Navy Personnel Research and Development Center San Diego CA
Selection of Marine Corps Drill Instructors.
Final rept.,
Lloyd S. Standlee, and Norman M. Abrahams. Mar 80, 33p Rept no. NPRDC-TR-80-17

The purpose of this effort was to assist the Marine Corps in more accurately predicting the success of prospective drill instructors. Students entering Drill Instructor (DI) school (N= 759) were administered an experimental test battery that covered both intellectual and motivational factors. Analyses of responses showed that a composite score of volunteer status, General Classification Test score, and level of education, and a Biographical Questionnaire score were predictive of performance in DI school. Performance in DI school was the best single predictor of performance on the job. (Author)

AD-A082 983/8 PC **A07**/MF **A01**
General Research Corp McLean VA
The Status of Infantry TOW, LAW, and Dragon Training in USAREUR.
Technical rept.,
Harold L. Moon, William A. Buxton, and Gerald E. Manthey. Nov 77, 133p ARI-TR-77-B5

Contract DAHC19-75-C-0009

A critical USAREUR mission is to develop and maintain a capability of engaging and neutralizing a numerically superior armored force. For the infantry, the primary antiarmor weapons are TOW, LAW and Dragon. This study was to determine the status of training for these weapons in USAREUR, and to recommend changes that would improve training effectiveness. Questionnaires and follow-up interviews were administered in infantry battalions (nine for TOW, eleven for LAW) representing both V and VII Corps. For Dragon, which was introduced only recently in USAREUR, two battalions were surveyed. TOW was perceived as the most effective because of its long range. Most company commanders were skeptical of LAW effectiveness because of its limited range and lethality. Dragon was perceived as enhancing combat effectiveness without requiring change in tactics.

AD-A082 988/7 PC **A03**/MF **A01**
Army Research Inst for the Behavioral and Social Sciences Alexandria VA
General Officers' Views on Continuing Education/Updating Program for General Officers,
Sally J. Van Nostrand, and M. Reid Wallis. Apr 78, 39p Rept no. ARI-RES PROBLEM REV-78-3

To help determine the need for a continuing education/update training program for general officers, 50 general officers were interviewed. The interviewed generals offered many recommendations and solutions to anticipated problems, which they believed would be encountered if the Army instituted a General Officer Education and Training Program. Nearly all respondents gave reasons for their replies, solutions to the problems they mentioned, and recommendations on those topics where they thought a change should be made. The attitudes and recommendations summarized here are the result of combining all similar responses. The views expressed are the composite views of all the interview general officers. No interpretation or conclusions, other than those provided by the respondents, are meaningful in this particular analysis. The comments/recommendations, therefore, are presented in the report without any attempt to weigh or evaluate them.

AD-A082 992/9 PC **A03**/MF **A01**
Systems Research Labs Inc Dayton OH
Expert Estimate Method of Generating Maintenance and Manpower Data for Proposed Air Force Systems: Users Guide.
Final rept.,
Daniel W. Sauer, Robert N. Deem, and William B. Askren. Mar 80, 27p AFHRL-TR-79-80
Contract F33615-77-C-0060
See also AD-A082 994.

The objective on this effort was to revise a prototype users guide for collecting expert estimates of maintenance, manpower, and training data for new or proposed Air Force systems. The revision of the users guide was based on three separate efforts: a review of recent expert estimate studies, an application of the expert estimate method using the prototype users guide, and an independent evaluation of the guide by experienced manpower professionals. A revised users guide was produced. It contains the procedures for using the expert estimate method to collect maintenance, manpower, and training data for new Air Force systems. It also contains examples of engineering description packages and questionnaires as well as cost data associated with the expert estimate method. (Author)

AD-A082 994/5 PC **A04**/MF **A01**
Systems Research Labs Inc Dayton OH
Expert Estimate Method of Generating Maintenance and Manpower Data for Proposed Air Force Systems: Evaluation.
Final rept.,
Daniel W. Sauer, Robert N. Deem, and William B. Askren. Mar 80, 51p AFHRL-TR-79-79
Contract F33615-77-C-0060
See also rept. no. AFHRL-TR-79-80, AD-A082 992.

The objectives of this study were to exercise an expert estimate method of generating maintenance and manpower data for new systems, to determine the accuracy of the estimated data, to evaluate a prototype guide describing the expert estimate method, to collect cost data for implementing the method, and to prepare a users manual for the expert estimate method. Seventy Air Force technicians having one of three ground radar Air Force Specialty Codes participated as expert estimators. These technicians estimated maintenance, manpower, and training requirements for a new operational ground radar system. The estimators had no experience on the radar system and used only an early design phase engineering description of the system as the basis for their estimates. The accuracy of the estimated data was determined by comparing the estimates with the operational data collected on the radar system. Results indicate that technicians can estimate maintenance task time, crew size, skill level, career field/AFSC requirements, and training times with acceptable levels of accuracy. The method also produced derived person-hour for troubleshooting and specific off-equipment maintenance tasks were not accurately estimated. The prototype users guide recommendations were generally supported in the areas of engineering description package and questionnaire preparation, qualifications of estimators, and analyses of estimated data. The person-hours cost data indicated that the minimum number of raters should be increased to 25, and that the expert estimate method seems to be an inexpensive and rapid method of obtaining maintenance manpower data.

AD-A082 995/2 PC **A03**/MF **A01**
Air Force Human Resources Lab Brooks AFB TX
Predicting Involuntary Separation of Enlisted Personnel.
Interim rept. 1 Nov 77-30 Jun 78,
Walter G. Albert. Jan 80, 36p Rept no. AFHRL-TR-79-58

This report contains the results of a study to compare the classification accuracy of the Motivational Attrition Prediction (MAP) method to the classification accuracy of other statistical algorithms capable of predicting involuntary separation within the Air Force enlisted force. The MAP computer program, which was implemented on the UNIVAC 1108 computer system at the Air Force Human Resources Laboratory, was modified to increase its data-handling and computational capabilities and was thoroughly tested. This report includes a description of the computerized statistical algorithms, subsample selection from the first-term airman population, independent and dependent variables, model formulation and analysis, comparison of required computer resources, and related research efforts. (Author)

AD-A082 996/0 PC **A05**/MF **A01**
McDonnell Douglas Astronautics Co-St Louis MO
Computer-Assisted Instruction in the Context of the Advanced Instructional System. Part II. Materials Development Procedures and System Evaluation.
Final rept.,
William E. Lewis, Donald E. Lovelace, Robert W. Mahany, and Wilson A. Judd. Mar 80, 84p AFHRL-TR-79-74
Contract F33615-78-C-0023
See also Part 1, AD-A081 071.

This report details the second of a two part project to design, develop, implement, and evaluate an authoring system which would provide a basis for the cost effective production of computer-assisted instruction (CAI) materials. It addresses the definition of a procedural model for CAI development, development of CAI Authoring Procedures Handbook, and evaluation of the complete authoring system. The procedural model consists of six major components: selection of target content, development of CAI materials, formative evaluation, definition and evaluation of student assignment rules, summative evaluation, and on-going evaluation. The Authoring Procedures Handbook describes the authoring procedures model and provides detailed instruction on use of the software tools. Evaluation of the system documents a substantial reduction in materials development time over that of conventional approaches. Additionally, the materials developed reduced average: lesson and objective failure rates, first attempt study time, lesson and objective failure rates, first attempt study time, lesson time to criterion, end-of-block objective failure rates, and end-of-block test objective failure rates as compared to non-CAI approaches. (Author)

DOE/AD/7405-3 PC **A16**/MF **A01**
Battelle Columbus Labs., OH.
1979 National Survey of Compensation. Paid Scientists and Engineers Engaged in Research and Development Activities.
Dec 79, 358p
Contract W-7405-ENG-92

This survey of compensation uses the maturity of age-wage approach, in which salary data are related to years since receipt of degree or chronological age. This report gives the results of the twelfth annual survey, conducted in 1979. Introductory material is given on the sampling plan (survey universe listing, sampling frame, sampling procedures, structure of sample), basic data for survey analysis (establishment data, employee data), entrance rates, trend analysis, geographic analysis, analysis of data (editing of raw data, use of varying axes, arithmetic formulas, median curves), important qualifications concerning survey results, and computation of approximate confidence limits. The bulk of the report contains salary tables of the following types: total survey tables; Bachelor's degree; Master's degree; Doctorate degree; professional degrees; median, curves-supervisory level by degree level, YSBD; nondegreed employees, age; working-as occupation, YSBD; sex, nonsupervisory employees, Bachelor's degree, working-as occupation; trend analysis-five-year identical-company comparisons, median curves; and standard metropolitan statistical area size by establishment size, median curves and census district curves. Employer questionnaire forms are appended. (ERA citation 05:012867)

DOE/TIC-11069 PC **A05**/MF **A01**
Battelle Columbus Labs., OH.
Phase XIII: the Twelfth Annual National Survey of Compensation Paid to Scientists and Engineers Engaged in Research and Development Activities in the United States. Final Report.
J. Newborg, J. Gabel, G. H. Beatty, P. Evans, and M. Spurgeon. 21 Dec 79, 89p
Contract W-7405-ENG-92

This survey utilized the maturity-type design. It obtained information concerning compensation and compensation-related characteristics of both nondegreed and degreed scientists and engineers engaged in research and development. Information was obtained concerning both the employees and employers. The universe specifications encompassed industrial establishments, educational institutions, nonprofit research institutes, federal laboratories, and federally funded research and development centers. The sampling plan was the same as for previous surveys. The sample size was maintained at approximately 300 establishments. The sampling plan incorporated stratification and clustering based upon establishment size in terms of numbers of scientists and engineers employed and size of the Standard Metropolitan Statistical Area in terms of scientists and engineers in the area. Trend analyses, showing changes in salary levels over a five-year period, were prepared. This report describes and discusses the various elements of the survey including survey forms, universe specifications and sampling, survey conduct, data analysis, and data processing. The project report provides not only a description of the survey, but presents information on development work done to improve the data processing procedures. The final section of the report makes recommendations for the conduct of the 1980 survey. 2 figures, 13 tables. (ERA citation 05:012868)

HRP-0901822/7 PC **A03**/MF **A01**
Puerto Rico Univ., San Juan.
Puerto Rico Dental and Other Health Professions Student Orientation and Recruitment Program. Executive Summary and Final Report.
Final rept.,
Jorge J. Fernandez. 23 Dec 78, 48p
Contract PHS-HRA-231-76-0080

The project was organized in 1975 to plan, develop, implement, and assess a formal recruitment program aimed at enrolling and training a higher proportion of qualified Puerto Rican high school

and baccalaureate students for the field of dentistry. Literature about practices used to motivate and recruit students to health professions was reviewed. Problems local to Puerto Rico regarding the lack of qualified applicants for dental school were assessed. Recruitment and orientation programs were developed in accordance with six regions of the island. An evaluation plan was devised to monitor progress in implementing the programs. Major benefits of the project included: increased knowledge of school personnel about student recruitment; good working relationships established among counselors of different faculties; the establishment of coordination mechanisms between counselors and other personnel in Puerto Rican schools; the organization of systematic and aggressive recruitment programs; and an increase in the number of qualified applicants. Other benefits were the preparation of promotional materials for all health careers, the organization of peer counseling groups, and the reorganization of recruitment and orientation services. Supporting data are provided.

HRP-0901825/0 PC **A02/MF A01**
Iowa Association of Homes for the Aging, Grinnell.
Coordinate and Implement Training Opportunities for Long-Term Care Provider Personnel.
Final rept. 30 Sep 77-30 Sep 78,
J. Rex Pippin. 1979, 23p
Contract PHS-HRA-230-77-0116

The State of Iowa has approximately 560 long term care facilities engaged in the care of older persons. These facilities are comprised of retirement centers, homes for the aged, residential care facilities, intermediate care facilities, skilled nursing facilities, hospitals and mental health centers. Working in these facilities are large numbers of personnel with minimal training, as well as individuals who have experience but require updated training. The Association therefore, expanded its educational program by establishing an education office in Des Moines, hired a full-time Director of Education and cooperated with Drake University to plan, coordinate, conduct and evaluate numerous educational offerings - involving eighteen total educational offerings for long term care personnel in Iowa.

HRP-0901826/8 PC **A05/MF A01**
Henry M. Goldman School of Graduate Dentistry, Boston, MA.
Guide for the Development of Extramural Training Programs in Dentistry,
Anthony Jong. 1979, 87p
Contract PHS-HRA-231-77-0600

A systematic approach to extramural program development in dentistry is presented. Because the role of dentists is changing from provider of essentially rehabilitative clinical services to that of integral member of the health care team concerned with preventive and early diagnostic services, dental education must be modified to provide students with appropriate experiences. The importance of extramural training is recognized by the American Dental Association and its Commission on Accreditation. The association believes that extramural programs should be formally structured as integral components of predoctoral curriculums. Guidelines for the development of extramural programs in dentistry focus on predevelopment (establishment of program goals, dental school considerations, and community and financial considerations); development (objectives, personnel and site selection, equipment and supplies, target population, selection criteria for students, length of training, program content and orientation, evaluation, and contractual agreements); implementation (student and faculty recruitment, orientation, facility design, and acquisition of equipment and supplies); and operation-evaluation. Appendixes contain additional information on extramural program requirements, evaluation instruments, contractual agreements for extramural programs, and an extramural program resource list.

HRP-0901828/4 PC **A14/MF A01**
Policy Research, Inc., Baltimore, MD.
Identification of Program Priorities in Continuing Dental Education Utilizing the Delphi Technique.
Final rept. 30 Sep 77-14 Dec 78,
Irene A. Jillson. 14 Dec 78, 323p
Contract PHS-HRA-231-77-0134

The Delphi technique was employed to analyze issues pertinent to continuing dental education (CDE). A panel of 41 consultants examined 21 issues and 12 programs in the first policy evaluation instrument (PEI) devised to prioritize issues in CDE. Several basic questions regarding the purpose of CDE emerged, e.g., panelists questioned the link between CDE and improved patient care. Another area of concern related to roles and responsibilities for various groups and organizations concerned with CDE. In the second PEI, panelists were asked to consider possible objectives of CDE, indicate the importance and feasibility of CDE objectives, present their views on the way in which influence and resources for CDE should be distributed, and describe roles and responsibilities of groups and organizations involved in CDE over the next 5-year period. Statistical analysis techniques were used to evaluate structured responses to both PEI's. In general, the consultant panel was more interested in upgrading CDE course and program offerings than in wholesale changes in the delivery or administration of CDE. The panel also expressed interest in guaranteeing the quality of CDE courses through standards or evaluation. The notion of limited Federal involvement in CDE was affirmed. Supporting data are provided.

PAT-APPL-6-132 644 PC **A05/MF A01**
Department of the Air Force Washington DC
Device for Generating Simulated Waveforms for an Electronic System Maintenance Trainer.
Patent Application,
M. F. Winthrop. Filed 21 Mar 80, 97p AD-D007 125/8
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A maintenance training system capable of precisely simulating both the inner and the outward functions of original electronic equipment is realized by utilizing a programmable waveform generator, a microcomputer and interfacing input/output circuits in a modular design that can be adapted to use with virtually any desired electronic system maintenance trainer. The system provides genuine waveform generation and display in a real time maintenance trainer with positive input/output control through line replacable unit read/write modules. The programmable waveform generator develops analog waveforms form digital control and picture data received from the micro-computer. The analog outputs of the programmable waveform generator drive the maintenance trainer's external meters, displays and oscilloscope and can be programmed to simulate point by point circuit tracing of the original electronic equipment.

PB80-165954 PC **A08/MF A01**
Manpower Demonstration Research Corp., New York.
Immediate Job Search Assistance: Preliminary Results from the Louisville WIN Research Laboratory Project.
Interim rept.,
Barbara S. Goldman. Feb 80, 174p DLETA-51-36-77-03-1
Grant DL-51-36-77-03

This report presents preliminary estimates of the early impacts of the Louisville WIN Research Laboratory project, which is testing a model for providing female AFDC recipients and applicants with access to job-readiness training and assistance with job search and support services immediately upon WIN registration.

PB80-168750 PC **A05/MF A01**
General Accounting Office, Washington, DC. International Div.
More Competence in Foreign Languages Needed by Federal Personnel Working Overseas.
Report to the Congress.
15 Apr 80, 88p ID-80-31

About 30,000 positions in the Federal Government require a proficiency in at least one of 45 foreign languages; most of these positions are overseas. Foreign affairs agencies are required by law to maintain systems for identifying and staffing positions which require foreign language skills. Approximately 70 percent of the employees in overseas positions identified by the systems have adequate foreign language skills, but improvements in the systems are needed. Other agencies with Americans abroad are not required to identify positions requiring foreign language skills and, except for the Department of Defense and the Foreign Agricultural Service, have not done so, but they should to ensure an adequate foreign language capability abroad.

PB80-169394 PC **A12/MF A01**
Saint Louis Univ., MO. Center for Urban Programs.
Vocational Exploration Program (1978).
Final rept.,
Brian P. Nedwek, John T. Manns, and E. Allan Tomey. Aug 79, 253p DLMA-28-29-78-53-F
Grant DL-28-29-78-53

The Vocational Exploration Program was designed to provide economically disadvantaged youth an opportunity to explore career opportunities in the private sector. Its central objective was to ease the transition from school to work through the development of cognitive and attitudinal skills appropriate to the world of work. Analysis of the summer program showed that sex and race were significantly related to attitudinal change, while age and year in school were unrelated to improved attitudes. Improvements in attitudes occurred disproportionately among VEP enrollees when compared with a sample of SPEDY enrollees. Program implementation strategies were very diverse and uneven in quality. Such diversity reflects the need to better structure vocational exploration efforts and to develop more elaborate guidelines and program materials.

PB80-170376 PC **A03/MF A01**
International Cooperation Administration, Washington, DC.
Etudes a l'Etranger Sous les Auspices de l'AID (Participants in Technical Cooperation).
Jul 57, 27p
Text in French. See also English version, PB-294 361.

The pamphlet describes AID's foreign study and participant training programs and how they operate. Training may take place either in the developing countries themselves or in the U.S. In the latter case travel to and from the U.S. is covered. Other programs are also mentioned such as observation trips, seminars, workshops, and international cultural exchange programs. The report is available in English as PB-294 361.

PB80-171911 PC **A04/MF A01**
Durham Urban Observatory, NC.
Further Analysis of the Employment and Personnel Practices of the Durham City Government.
David W. Peterson. Dec 78, 58p HUD-0000670

This study is a followup to a 1976 statistical study in Durham, N.C., depicting white males as having unusual success in increasing their wages. The city's employee history file was used in the follow-up study, which covered the period from early 1969 through the end of 1976 for all persons employed by the city as of the end of 1976, or who had terminated their employment within the preceding 18 months. The file recorded the average end of 1976 salaries of employees of that date who were hired by the city prior to the end of 1969, broken down by race and sex and by job classification, pay range, and pay step. It was thus possible to compare the average 1976 salary of blacks to that of nonblacks for a group of people all of whom occupied similar positions as of the end of 1969. It was shown that the relative disparities between blacks as a group, who tend to advance slowly from low - paying jobs, though at a normal rate from others, and white males, who have had unusual success in increasing their wages, are apparently attributable in large part to imbalances in the racial distribution of employees across jobs as of the end of 1969, and to no significant extent to disparate rates of wage advancement since then among persons grouped by the jobs they held at that time. Questions remain as to whether or not the racial composition by job or employees was appropriate for that time and whether or not it was

appropriate that the jobs held predominantly by nonblacks tended to be those with superior wage advancement possibilities. It was also shown that there is some evidence that black males have tended to advance more slowly than similarly - situated nonblack males, suggesting a need for further studies on disparity in advancement opportunities for black males. Further analyses of the Durham city government personnel practices are included. Supportive tabular information, personnel history files, and a description of job classifications in the analysis are provided.

PB80-174832 PC **A06**/MF **A01**
General Accounting Office, Washington, DC. Financial and General Management Studies Div.
Statistical Data on Department of Defense Training of Foreign Military Personnel.
15 Apr 80, 113p FGMSD-80-48

The report provides statistical data on military training provided foreign students by the Department of Defense. The information shows the number of students trained, the countries involved, the type of training provided, and the cost included in charges for this training.

PB80-175078 PC **A09**/MF **A01**
Ministerio de Educacion, Panama City. Dept. Tecnico.
Manualtidades (Handmade Crafts),
A. Martinez Surroca. 1954, 176p
Text in Spanish. Sponsored in part by Agency for International Development, Washington, DC.

The manual describes how to make numerous objects. It is used to encourage the imagination of students to be able to build practical and economic objects such as simple furniture, flower pots, lamp shades, radios, and how to preserve fruits and vegetables, wines, vinegars, and cheeses. The manual is illustrated.

PB80-176472 PC **A03**/MF **A01**
President's Commission on Pension Policy, Washington, DC.
Demographic Shifts and Projections: The Implications for Pension Systems.
Working paper,
Barbara Boyle Torrey. Aug 79, 46p

The age distribution is the basic foundation of the pension structure. In general, the aged are the beneficiaries of the pensions, and the non-aged are the major contributors. This first working paper from the President's Commission on Pension Policy measures future demographic trends relating to population, mortality, and female fertility and attempts to forecast the implications of these trends on future pension policy.

PB80-176480 PC **A05**/MF **A01**
President's Commission on Pension Policy, Washington, DC.
An International Comparison of Pension Systems.
Working paper,
Barbara Boyle Torrey, Carole J. Thompson, Karen Orlansky, and Robert Firestine. Mar 80, 97p

The pension systems of Canada, France, Italy, Japan, the Netherlands, Sweden, Switzerland, the United Kingdom, and West Germany are reviewed primarily because the social and economic conditions of these countries are similar to those in the United States. The first section examines the retirement income goals of other countries, the second section examines the social security systems of each country, the third section discusses private pensions. A final section summarizes the major similarities and differences between foreign pension systems studied and those existing in the United States.

PB80-176498 PC **A03**/MF **A01**
President's Commission on Pension Policy, Washington, DC.
The Use of Pension Fund Capital: Its Social and Economic Implications - Some Background Issues.
Working paper,
Judith Mares. Nov 79, 39p

This working paper from the President's Commission on Pension Policy was prepared for a public hearing of the study group which was held on December 10 & 11, 1979, on the subject of the ownership and control of pension fund assets. While considerable debate has taken place on this issue, the conceptual framework behind the issue is far from clear. The Paper attempts to set forward some of the major issues involved in order to obtain a better understanding of their relationship to pension policy.

PB80-176506 PC **A03**/MF **A01**
President's Commission on Pension Policy, Washington, DC.
The Funding Issue and Modern Growth Theory; Technical Paper.
Working paper,
Mordecai Kurz, and Marcy Avrin. Sep 79, 50p

This working paper from the President's Commission on Pension Policy attempts to provide technical details and a survey of the literature which were the basis for the Commission's Working Papers entitled 'Private Pensions and Capital Formation' and 'Social Security and Capital Formation: The Funding Controversy'. The funding of private pensions is evaluated in the context of modern economic growth theory. A detailed bibliography is included.

PB80-176514 PC **A02**/MF **A01**
President's Commission on Pension Policy, Washington, DC.
Private Pensions and Capital Formation.
Working paper,
Mordecai Kurz, and Marcy Avrin. Aug 79, 16p

This working paper from the President's Commission on Pension Policy details research measuring the effect and relationship between participation in a private pension plan and personal savings behavior. The paper attempts to assess any net effect that the rapid growth of private pension capital may have on the overall rate of savings in the U.S. economy.

PB80-176522 PC **A02**/MF **A01**
President's Commission on Pension Policy, Washington, DC.
Social Security and Capital Formation: The Funding Controversy.
Working paper,
Mordecai Kurz, and Marcy Avrin. Sep 79, 22p

This working paper from the President's Commission on Pension Policy details research measuring the effect and relationship between social security coverage and personal savings behavior. Arguments for and against the concept of 'full funding' for the Social Security System. This concept requires a fund of assets whose value equals the total financial obligations of the system.

PB80-176530 PC **A04**/MF **A01**
President's Commission on Pension Policy, Washington, DC.
Retirement Income Goals.
Working paper,
Elizabeth L. Meier, Barbara Boyle Torrey, and Cynthia C. Dittmar. Mar 80, 69p

The determination of national retirement income goals is essential to the work of the President's Commission on Pension Policy. This Commission working paper examines current ways in which this goal has been expressed and suggests policy options in the area. A discussion of inflation's effects on retirement income is also included.

PB80-176548 PC **A07**/MF **A01**
President's Commission on Pension Policy, Washington, DC.
Varieties of Retirement Ages.
Working paper,
Elizabeth L. Meier, Cynthia C. Dittmar, and Barbara Boyle Torrey. Jan 80, 133p

This working paper from the President's Commission on Pension Policy explores policy options regarding retirement age policy. The paper also contains an extensive discussion of the development of present retirement age policy in the United States. Options for future policy are listed based on the information detailed in the Paper.

5J. Psychology (Individual and Group Behavior)

AD-A082 433/4 PC **A03**/MF **A01**
Illinois Univ At Urbana-Champaign Dept of Psychology
The Moon Illusion: Apparent Size and Visual Accommodation Distance.
Interim rept.,
Joyce H. Iavecchia, Helene P. Iavecchia, and Stanley N. Roscoe. Nov 78, 32p ENG-PSY-78-4/AFOSR-78-3, AFOSR-TR-80-0229
Contract F49620-77-C-0117

In two experiments the apparent size of a simulated horizon moon was measured as a function of the distribution of texture in the natural vistas against which it appeared. Size was found to increase as the distance to the dominant textural stimulus to accommodation increased and to decrease as the moon rose above the plane of surface texture. In the second experiment, the subjects' accommodation distances to the various scenes were also measured with a laser optometer, and after appropriate transformations, the size judgments were found to correlate .89 with the measured accommodation values, thereby suggesting that the fabled moon illusion is mediated by the oculomotor adjustments of visual accommodation. (Author)

AD-A082 440/9 PC **A03**/MF **A01**
Perceptronics Inc Woodland Hills CA
An Interactive Computer Aiding System for Group Decision Making.
Quarterly technical rept.,
Steven Johnston, and Randall Steeb. May 79, 31p Rept no. PQTR-1046-79-5
Contract MDA903-77-C-0184, ARPA Order-3344

This report describes progress on work centered on the transfer of an interactive computer aid for group decision making to the DARPA/CTO Demonstration and Development Facility. The report includes: (1) implementation details of both the black and white version and the color version, (2) a description of software support modules required for system integration as a generalized demonstration program at the DDF, (3) the design description of the Group Aid/CACI Executive Aid integration, and (4) a progress report on the full scale experimental studies currently being administered. (Author)

AD-A082 441/7 PC **A04**/MF **A01**
Purdue Univ Lafayette IN School of Electrical Engineering
Detection and Estimation of Single Event Related Potentials.
Final rept. 1 Jun-30 Sep 79,
Clare D. McGillem, and Jorge I. Aunon. 1979, 60p AFOSR-TR-80-0225
Contract F49620-79-C-0084

The Performance of linear stepwise discriminant analysis and quadratic discriminant functions in classifying single event related brain potential are compared. A frequent V and infrequent inverted V visual stimulus was employed and measurements were made with scalp electrodes at Pz, Cz, and Oz. Results are reported for using training data from one test to classify results of that test, to classify data from a test at a different time, and for classifying data from other subjects. Performance using the quadratic discriminant function was generally superior to that of the linear discriminant function. Single event classification accuracies greater than 90% were obtained when training and test data from the same experiment were used. Substantially poorer performance was obtained when data from one test was used to classify responses measured from a test conducted at a different time or using a different subject. Reasons for these discrepancies are discussed. (Author)

AD-A082 507/5 PC **A03**/MF **A01**
Illinois Univ At Urbana-Champaign Dept of Psychology
An Empirical Comparison of Latent Trait Theory and Hierarchical Factor Analysis in Applications to the Measurements of Job Satisfaction.
Technical rept.,
Charles K. Parsons, and Charles L. Hulin. Mar 80, 50p Rept no. TR-80-2

Contract N00014-75-C-0904

Data were collected on the Job Descriptive Index from a large heterogeneous sample of respondents. These data are used to compare empirically a latent trait model to a hierarchical factor analytic model. Latent trait item parameters estimated by LOGIST agree quite well with the item loadings on a general satisfaction factor based on the methodology suggested by Humphreys. These results are consistent with a hierarchical job satisfaction construct that has one general factor and multiple group factors. The implications of the results and future research are discussed. (Author)

AD-A082 543/0 PC **A06**/MF **A01**
Colorado Univ At Boulder Inst for the Study of Intellectual Behavior
Resource Allocation in Cerebral Specialization.
Technical rept.,
Alinda Friedman, and Martha C. Polson. Jan 80, 109p Rept nos. ISIB-TR-93, TR-1-ONR
Contract N00014-79-C-0679

A broad and cohesive theoretical framework is described from which to understand how cerebral specialization of function contributes to the adaptivity and flexibility of the human information processing system. In particular, we propose that the anatomical division of the brain can be mapped onto a division of processing resources so that the left and right hemispheres together comprise a system in which there are two pools of mutually inaccessible, finite, resources. Further, these two types of resources cannot be made available in different amounts for a normal individual whose callosum is intact. Thus, the framework we propose is essentially a special case of a multiple-resources model of limited-capacity information processing (Navon & Gopher, 1979), in which we tie the existence and number of resource pools to the anatomical structure of the brain. Our theoretical structure allows us to account for a broad range of data from both the divided attention and cerebral specialization literatures, including experiments involving perceptual and cognitive information processing, control of motor performance, and changes in the electrical activity of the brain.

AD-A082 568/7 PC **A04**/MF **A01**
Illinois Univ At Urbana-Champaign Dept of Psychology
Organizational and Non-Organizational Influences on Job Attitudes of Part-Time and Full-Time Employees.
Technical rept.,
Howard E. Miller, and Charles L. Hulin. Feb 80, 66p Rept no. TR-80-1
Contract N00014-75-C-0904

Several hypotheses concerning work and non-work social influences on part-time and full-time employees were investigated. Predictions were derived from role theory (Gross, Mason, and McEachern, 1958), and partial inclusion notions (Katz and Kahn, 1978). Survey data were collected from 1632 retail employees working part- or full-time in one of 41 geographically dispersed organizational units. Part-time employees felt less involved in the organizational role but were more satisfied generally than full-time employees and perceived lower conflict, greater communication accuracy and greater communication openness than did full-time employees. The two job status groups did not differ in perceptions of conflict from non-organizational sources nor in ambiguity concerning work role activities. They were similar also in their commitment to the organization and in their intentions to remain with the organization. Finally, relations of non-organizational social influences with measures of psychological attachment were equivalently high for both part-time and full-time employees, as were relations among measures of work role perceptions and psychological attachment. Discussion cites sample-based explanations and the utility of role theory and partial inclusion to account for the data. Directions for further research contrasting these two status groups are suggested. (Author)

AD-A082 719/6 PC **A02**/MF **A01**
Human Resources Research Organization Alexandria VA
The Effect of Various Levels of Auditory Feedback on Pursuit Rotor Performance.
Staff paper,
Richard W. Sheldon, Elmo E. Miller, and John F. Bjorklund. May 70, 24p
Contract DAHC19-70-C-0012
Report on Basic Research 9, 'Learning of Skills'.

To compare the effects of different levels of auditory feedback on performance of a pursuit rotor task, each of five groups (20 subjects per group) was given five sessions of practice (seven trials per session). Feedback during Sessions 2 - 4 for four of the groups consisted of momentary clicks for some minimum interval of continuous contact during a session. Clicks were provided by a counter, located behind the pursuit rotor so that the subject could see how many signals he had received during the session. The fifth group (control) received no feedback at any time. The results show that auditory feedback facilitated tracking performance, the greatest facilitation occurring with intermediate levels of feedback, though not all differences between groups were statistically dependable. Differences between the feedback groups and the control group decreased when feedback was withdrawn (in Session 5). (Author)

AD-A082 749/3 PC **A05**/MF **A01**
Florida State Univ Tallahassee Dept of Movement Science and Physical Education
Achievement in a Serial Positioning Task and the Role of Learner Strategies.
Technical rept. May-Jun 79,
Robert N. Singer, Susan Ridsdale, and Gene G. Korienek. Dec 79, 77p ARI-TR-430
Contract MDA903-77-C-0200

College students (N = 40) were randomly assigned to one of four conditions in order to ascertain the effectiveness of various learner strategies upon the learning, retention, and transfer of a computer-managed serial motor task. The four conditions were imagery, chunking, rhythm, and control. The subject's task was to move a joystick which in turn moved a cursor on a monitor, to each of 10 predetermined positions and correct sequence. In general, the typical serial recall curve and the expected primacy-recency effect was not found, perhaps due to the number of responses required on each trial. Imagery and chunking strategies provided more accurate and consistent performance across all 10 positions in the acquisition and transfer tasks. No difference in performance in retention were noted among the groups, although the subjects reproduced positions more accurately after the unfilled retention interval as compared with the filled interval. (Author)

AD-A082 751/9 PC **A06**/MF **A01**
Applied Science Associates Inc Valencia PA
Contemporary Views on Criterion-Referenced Testing.
Technical rept.,
Robert W. Swezey, Richard B. Pearlstein, William Ton, and Angelo Mirabella. Oct 79, 104p ARI-TR-416
Contract DAHC19-74-C-0018

This review of the technical and theoretical literature in the area of criterion-referenced testing (CRT) considers a number of areas in CRT development and application. Discussed, in turn, are questions of CRT reliability and validity in both practical and theoretical areas. Different methods of CRT construction are reviewed, as is the question of simulation fidelity (e.g., the estimate to which CRTs can and should mirror real-world performance conditions). Discussion is directed to the use of CRTs in mastery learning contexts and to test materials development and item sampling. Diagnostic uses of CRTs and the establishment of cut-off scores are considered. Uses of CRTs in public education and military context are reviewed. Finally a position is set forth on general and theoretical aspects of CRT construction and use. (Author)

AD-A082 828/5 PC **A03**/MF **A01**
Minnesota Univ Minneapolis Computerized Adaptive Testing Lab
Effects of Immediate Knowledge of Results on Achievement Test Performance and Test Dimensionality.
Research rept.,
Kathleen A. Gialluca, and David J. Weiss. Jan 80, 35p Rept no. RR-80-1
Contract N00014-76-C-0627

These two studies investigated the effects of administering immediate knowledge of results (KR) concerning the correctness or incorrectness of item response on a computerized adaptive test of biology achievement. In the case of incorrect responses, the correct answers were provided to the student. The results of these studies indicate that the provision of informative KR did not systematically increase total test scores, as would be expected if students were using information from previously administered items to help them answer subsequent items. Furthermore, provision of informative KR did not alter the dimensionality of the achievement tests administered, indicating that the latent trait model assumption of local independence among the items was not affected by any significant degree. (Author)

AD-A082 844/2 MF **A01**
Institute of Behavioral Sciences Honolulu HI
Person-Situation Research Strategies for Interethnic Empathy, Interethnic Competence and Ethnic Trait Attributions in the Job Setting.
Rept. no. 3 (Final),
Norman Dinges, and Kenneth Tokuno. Jan 80, 27p
Contract N00014-77-C-0345
Availability: Microfiche copies only.

A person-situation research strategy was used in developing videotapes depicting the responses of Japanese-Americans and Caucasian-Americans to different situations within the job setting (e.g., Job Interview, Promotion Seeking and Termination). judgments of stimulus person's affective and motivational states, response competence, and trait attributions were obtained from both Japanese-American and Caucasian-American judges. Main effects for situation and ethnicity of stimulus person, and higher order interactions between situation, ethnicity of stimulus person, and ethnicity of other within the situation were found for all categories of judgment. Results are discussed in terms of revised interpretations of previous research on interethnic empathy, interethnic competence assessment, and ethnic trait attributions. (Author)

AD-A082 845/9 PC **A03**/MF **A01**
Minnesota Univ Minneapolis Dept of Psychology
Computerized Adaptive Performance Evaluation.
Final rept. Feb 76-Jan 80,
David J. Weiss. Feb 80, 27p
Contract N00014-76-C-0627

Three years of research on computerized adaptive achievement testing are summarized. The goals of the research program are described, and the research approach is summarized and related to the nine technical reports completed under this contract. Major research findings are presented. The implications of the research methods and results for future research in computerized adaptive achievement testing are described. Also included are abstracts of the nine technical reports and a list of other project reports and papers. (Author)

AD-A082 883/0 PC **A05**/MF **A01**
Systems and Evaluations in Education Inc Santa Cruz CA
Multicultural Leader Behaviors in Ethnically Mixed Task Groups.
Final rept.,
Manuel Ramirez, III , Raymond T. Garza, and Barbara Goffigon Cox. 15 Mar 80, 92p Rept no. SEE-10/78-FR3-80
Contract N00014-79-C-0015

Based on a model of multiculturalism developed by Ramirez and colleagues, this project sought to identify Mexican-American college students who represent a range of multicultural experiences, to identify cognitive and behavioral characteristics of these students as well as examine development of these characteristics, and finally to examine leader behaviors of students with extensive versus minimal multicultural experience, specifically in ethnically mixed task group situations. The Flexibility, Unity and Expansion model predicts, by its definitions, that multicultural people are more comfortable, adaptable and culturally flexible in different situations. Multicultural people, because of their greater experience in diverse sociocultural environments should also have developed more social sensitivities, such as sensitivity to differences in

others. They should be more flexible in terms of cognitive style, that is, in modes of processing information, or organizing, classifying, assimilating, and responding to the environment. In addition, they should have developed interpersonal skills such as abilities to facilitate interethnic contacts and mediation abilities. Multicultural persons should be able to effect better interpersonal understanding and cooperation among peoples and to prevent possible misinterpretations of verbal and non-verbal behaviors which could lead to interpersonal conflict.

AD-A082 890/5 PC **A03/MF A01**
Indiana Univ-Purdue Univ At Indianapolis Center for Applied Research and Evaluation
Relationship Between Intercultural Awareness and Personality Variables in Interracial Encounters.
Final rept. 26 Aug 77-30 Aug 78,
Oliver C. S. Tzeng, and Dan Landis. Oct 79, 39p CARE-79-2, ARI-TR-422
Contract DAHC19-77-C-0056
See also AD-A060 560 and AD-A061 354.

The present study was conducted in order to investigate the relationships between an individual's personality characteristics and his or her understanding of the dynamics involved in potential inter-racial conflicts and controversies in the Army institution. Data collected from 78 Army personnel, with about equal proportions of both blacks and whites, and of both officers and enlisted men, included the ratings on four measures: (a) a set of predeveloped intercultural awareness (IA) questions, (b) the Machiavellianism scale, (c) the Least-Preferred Coworker (LPC) scale, and (d) the group atmosphere scale. Within-measure analyses of the last three scales revealed interesting results of inter-race and/or inter-rank differences in attribution of various personality traits inherent in the measures. Between-measure analyses in using the IA Scale as a dependent variable yielded two important principles in inter-racial relations: (a) intercultural awareness is directly related to an individual's personality and cognitive style characteristics, and (b) elevation of an individual's cultural awareness level will definitely improve one's attitudes, values, and behavioral dispositions toward the members of another culture, and thus decrease the intercultural gaps and/or conflicts in interracial encounters.

AD-A082 929/1 PC **A03/MF A01**
Human Engineering Lab Aberdeen Proving Ground MD
Development of a Computer Graphic Methodology for Investigating the Decision Making Aspects of Suppression.
Final rept.,
Chauncey E. Wilson, and James P. Torre, Jr. Jan 80, 47p Rept no. HEL-TN-2-80

A graphic computer simulation was developed for a pilot experiment designed to examine decision making in a no-risk situation. This experiment was a precursor of a detailed investigation of suppression. Male and female soldiers viewed a CRT display showing a series of minefield patterns of varying density. In Phase I, they estimated the probability that a tank image could pass through the minefield patterns. In Phase II, they decided whether or not to send the tank image across the minefields. Subjects' estimates of probabilities of success in Phase I closely matched the actual probabilities of success. However, the proportion of 'go' decisions made in Phase II did not parallel subjects' estimates of probabilities of mission success. Female subjects took more time to make decisions in Phase II than males, but there were no differences in predictive ability between males and females. A methodology to examine the effect of risk on decision making is discussed and additional studies are recommended. (Author)

AD-A083 012/5 PC **A03/MF A01**
Michigan Univ Ann Arbor Human Performance Center
A Psychophysical Approach to Dimensional Integrality.
Technical rept.,
Robert G. Pachella, Patricia Somers, and Mary Hardzinski. Mar 80, 43p Rept nos. 014523-7-T, TR-64
Contract N00014-76-C-0648

The paper defines dimensional integrality and presents a theory of integrality that explains the manner and conditions under which integrality operates. Integrality is defined as a property of the mapping of a physical specification of complex stimulation into the multi-dimensional psychological characteristics of the stimulation as perceived. An experiment is presented that test this notion of integrality as psychophysical compatibility. Two qualitatively different types of multi-dimensional scaling solutions obtain for pair-wise similarity judgments of two sets of triangles. Both sets of stimuli are defined by two physically orthogonal dimensions, but in one set the physical specification is incompatible with the perceived characteristics, and in the other set the physical specification is compatible with the perceived characteristics. This definition of integrality is validated against data obtained from standard information processing tasks involving speeded classification. (Author)

N80-21100/6 PC **A02/MF A01**
Columbia Univ., New York. Psychophysics Lab.
Development and Evaluation of a General Aviation Real World Noise Simulator.
Final Report.
E. Galanter, and R. Popper. Mar 80, 21p NASA-CR-159237
Grant NSG-1541

An acoustic playback system is described which realistically simulates the sounds experienced by the pilot of a general aviation aircraft during engine idle, take-off, climb, cruise, descent, and landing. The physical parameters of the signal as they appear in the simulator environment are compared to analogous parameters derived from signals recorded during actual flight operations. The acoustic parameters of the simulated and real signals during cruise conditions are within plus or minus two dB in third octave bands from 0.04 to 4 kHz. The overall A-weighted levels of the signals are within one dB of signals generated in the actual aircraft during equivalent maneuvers. Psychoacoustic evaluations of the simulator signal are compared with similar measurements based on transcriptions of actual aircraft signals. The subjective judgments made by human observers support the conclusion that the simulated sound closely approximates transcribed sounds of real aircraft.

UCRL-Trans-11522 PC **A03/MF A01**
(A) Parapsychology, (B) In Favor of a Scientific Approach to Parapsychology, (C) Psychokinetic Experiments with Metal Test Samples.
A. Roux, C. Crussard, and J. Bouvaist. Jun 79, 44p
Contract W-7405-ENG-48
A, Jaune et la Rouge n342 P3, 5, 13-23 Jun 1979.

Eight experiments particularly well monitored involving the deformation of metal samples by an alleged psychokinetic agent are described. The subject, in separate tests, caused bends to appear in metal rods, magnetic properties of steel to change, and the surface hardness of metal disks to increase. These results were achieved without any apparent physical action on the part of the subject. (ERA citation 05:012550)

5K. Sociology

AD-A082 826/9 PC **A02/MF A01**
Army Research Inst for the Behavioral and Social Sciences Alexandria VA
Reliability of a Measure of Institutional Discrimination against Minorities.
Technical rept.,
Dwight J. Goehring. Dec 79, 19p Rept no. ARI-TR-429

The technical properties of a statistical measure of the concept of institutional discrimination are discussed. Two methods of dealing with the problem of reliability of the measure in small samples are presented. The first is based upon classical statistical theory and the second derives from a series of computer-generated Monte Carlo analyses. A test for differences between the measures is also developed and presented. (Author)

AD-A082 952/3 PC **A02/MF A01**
Research Triangle Inst Research Triangle Park NC
Observations of Interrank Conflicts at the Company Level: Drug and Alcohol Abuse.
Research memo.,
William C. Eckerman, Jay R. Williams, and Douglas A. Ramsay. Dec 75, 14p ARI-RM-75-15
Contract DAHC19-73-C-0032

The period of greatest public concern with drug abuse as a serious social problem was the early 1970's, and the Army felt a special concern about drug abuse as a possible threat to defense readiness. As a result, the Army Research Institute conducted research in 1971-1975 on the behavioral and social aspects of drug and alcohol abuse in the Army. This report is of interest in 1977 in light of the company-level leadership problems now being addressed by organizational effectiveness programs Army-wide. The present research memorandum presents observations collected during a 1974 investigation of the relationships between company-level leadership and the illicit use of drugs or excessive drinking; the data consist of responses to structured questions asked during small group discussion sessions with peer groups of various ranks in Army companies.

PB80-132053 PC **E09/MF A01**
National Technical Inst. for the Deaf, Rochester, NY.
Captioning: Shared Perspectives.
Final rept.,
Barbara Braverman, Barry Cronin, and Melody Hertzog. 11 Dec 79, 259p NTID/MDS/IT-80/0101
Sponsored in part by Department of Health, Education, and Welfare, Washington, DC.

The conference format was designed to allow meetings of special interest groups as well as to facilitate sharing among all participants. The whole group participated in several sessions addressing different philosophies of captioning, including verbatim and edited captioning. Some of the events which occurred during the conference were: A captioning showcase where participants displayed a variety of captioned programs which they had produced; An audience panel consisting of deaf viewers who shared their feelings about and perceptions of captioned television, and a 5-1/2 minute program segment captioned by five different agencies, each in their distinctive captioning style.

PB80-164379 PC **A04/MF A01**
California Univ., Davis. Interdisciplinary Systems Group.
SIMUL, An Interactive Computer Program Designed to Provide a Means for Simplified Modeling of Complex Socio-economic Systems,
Andy Werback. May 73, 61p NSF-RA-E-73-616
Grant NSF-GI-27

Created as a problem-oriented general purpose program suitable for modeling and analysis of socio-economic systems, SiMUL is designed for use on a large scale digital computer (General Electric's Mark III time-sharing system), as an applications-oriented computer language that allows problems to be prepared directly and simply from block diagrams or equations. SIMUL provides the user with many general functions: integration, interpolation, demographic and plotting routines, and on-line program changes. This program is designed to be easy to use and understand, even for one who is not trained as a computer programmer, since it provides many options for rapid and efficient data input and output, thus allowing the user to concentrate on the phenomenon being studied rather than the mechanics of implementing the simulation. The SIMUL program is outlined and described including a list of the program's basic features together with its limitations and costs. The main program and its subroutines are briefly described defining the action taken by each subroutine, and one important subroutine is listed in detail. The system is illustrated through flowcharts. Formats of data input are shown with examples of how SIMUL can be used as a problem-exploring tool. Finally, the entire SIMUL program is listed.

PB80-167299 PC **A06/MF A01**
General Accounting Office, Washington, DC. Health Resources Div.
Action Needed to Improve Management and Effectiveness of Drug Abuse Treatment.
Report to the Congress.

14 Apr 80, 103p HRD-80-32

Cutting across racial, cultural, social, and economic lines, drug abuse is estimated to cost society about $10 billion a year. An essential part of the Federal strategy to prevent and control this abuse is the treatment of abusers. Nationwide, about $518 million is spent annually to treat drug abusers, with over $130 million coming from HEW's National Institute on Drug Abuse. The report identifies a number of program policies and management problems that operated as disincentives to providing adequate treatment to the greatest number of drug abusers. GAO makes a number of recommendations to HEW to improve program management.

PB80-167307 PC **A05**/MF **A01**
General Accounting Office, Washington, DC. Community and Economic Development Div.
Ways of Providing a Fairer Share of Federal Housing Support to Rural Areas.
Report to the Congress.
28 Mar 80, 98p CED-80-1

Many rural American families still live in substandard conditions, although progress has been made over the last 30 years in alleviating housing shortages and improving conditions. Rural housing problems today are most acute in remote areas, among the elderly, and among those who rent. Rural areas receive only about 20 percent of the Federal housing support available despite having one-third of the Nation's population and one-half of the substandard housing. Urban areas have benefited more. Future progress depends on increasing the supply of mortgage credit, providing greater homeownership opportunities for moderate-income families, targeting more Federal housing funds to the neediest areas, and emphasizing programs to upgrade existing housing and develop new sites.

PB80-168057 PC **A08**/MF **A01**
Carnegie-Mellon Univ., Pittsburgh, PA. Graduate School of Industrial Administration.
A Theoretical and Empirical Model of Fertility and Married Women's Allocation of Time Over the Life Cycle,
V. Joseph Hotz. Mar 80, 161p
Grant DL-91-42-78-15

In this report the authors present a life cycle, economic model of household's conception decisions and married women's allocation of time decisions. The model enables one to examine the economic determinants of the timing of birth decisions and the interrelationships of such timing decisions with the wife's participation in the labor force. Also examined are the impacts of future uncertainty about the household's sources of income on conception and labor supply decisions. The authors utilize the theoretical framework to specify an econometrically tractable model of household conception decisions and of the wife's labor supply decisions at some stage in the household's life cycle. The model is estimated for black and white households in the United States. The authors find that economic variables, such as wages and income, significantly affect the typical household's annual conception decision and the wife's labor supply decision. The authors also find that an important source of difference in behavior across racial groups is in the wife's childcare time commitment.

PB80-168370 PC **E04**/MF **E04**
International Inst. for Applied Systems Analysis, Laxenburg (Austria).
Rural-Urban Population Projections for Kenya and Implications for Development.
Final rept.,
Mahendra M. Shah, and Frans Willekens. c1978, 88p RM-78-55

The paper projects the rural and urban populations of Kenya into the future by applying the methodology of multiregional demography. A base run and six alternative scenarios of fertility, mortality, and rural-urban migration are considered. The demographic consequences of these alternative scenarios on employment, demand for food, health, education, and on development in general are analyzed separately for the urban and rural sectors. A General framework for the study of the urbanization process is also proposed. (Copyright (c) 1978 IIASA.)

PB80-168404 PC **E03**/MF **E03**
International Inst. for Applied Systems Analysis, Laxenburg (Austria).
Regional Multiplier Analysis: A Demometric Approach.
Final rept.,
Jacques Ledent. cMar 78, 51p RR-78-3

The paper reports on the design and testing of an adequate framework for conducting regional multiplier studies in areas experiencing rapid population growth. It puts forward the demometric approach, one that applies econometric methods to the analysis of demoeconomic growth. Two alternative models are proposed here. The first is an aggregate model presenting a demometric revision of the traditional economic base model. The second model, an enlarged version of the first, is characterized by a breakdown of economic activities into nine major sectors. Both models are fitted to data for the rapidly growing metropolitan area of Tucson, Arizona, USA. The models are then used to derive tentative impact and dynamic multipliers which substantiate the role of households as consumers and suppliers of labor in the development of Tucson SMSA.

PB80-168412 PC **E10**/MF **E10**
International Inst. for Applied Systems Analysis, Laxenburg (Austria).
Spatial Population Analysis: Methods and Computer Programs.
Final rept.,
Frans Willekens, and Andrei Rogers. cNov 78, 307p RR-78-18

The report reviews the integrated methodology for spatial (or multiregional) demographic analysis developed at IIASA, presents the Fortran IV codes of the subroutines, and includes a user's manual for implementing this methodology. Programs included are the multiregional life table; multiregional demographic projections; fertility and mobility analyses of both life table and stable populations; stable population analyses; the spatial reproductive value; and the analysis of alternative paths to spatial zero population growth. The focus of the report is on the interpretation of the output. A user's manual describes steps to be taken in the preparation of the data deck.

PB80-170491 PC **A03**/MF **A01**
Office of Science and Technology Policy, Washington, DC.
What Can Be Done to Improve Intergovernmental Science and Technology,
Paul R. Brockman. 2 Jan 79, 49p
Prepared by National Aeronautics and Space Administration, Washington, DC.

Science and technology can make a more significant contribution to State and local governments than they are now making. That is a major conclusion to be drawn from the views of more than 130 individuals who are involved as leaders in current efforts to apply science and technology to State and local needs. These views are expressed in response to a questionnaire administered by the staff of the Office of Science and Technology Policy in the Executive Office of the President in the Fall of 1978.

PB80-170780 PC **A03**/MF **A01**
Massachusetts Inst. of Tech., Cambridge. Operations Research Center.
On Urban Homicide: A Statistical Analysis. Innovative Resource Planning in Urban Public Safety Systems.
Working paper,
Arnold Barnett, Daniel J. Kleitman, and Richard C. Larson. Mar 74, 49p WP-04-74, NSF-RA-S-74-123
Grant NSF-GI-38004

A statistical analysis is made of homicide rates in the 50 largest American cities for four different years. Several mathematical models for future homicide growth are proposed from the analysis, and under each the probability of death by murder and corresponding drop in life expectancy are estimated for babies born now in each of the 50 cities.

PB80-171929 PC **A13**/MF **A01**
Urban Research and Development Corp., Bethlehem, PA.
Recommendations to HUD for Improving the Mobile Home Living Environment. Individual Sites, Mobile Home Parks and Subdivisions (Task IV B).
Summary rept.
1977, 288p HUD-0000675
Contract HUD-H-2635

The major obstacles to mobile home livability arise from the reluctance of local governments and lending institutions to accept mobile homes as a viable source of housing. Short - term mobile home loans mean larger monthly payments and less money for landscaping or good site development. Local ordinances often ban mobile homes or force them into undesirable locations. However, with proper planning these dwellings can be quite attractive. Site designs which group units around cul - de - sacs or angle them give a pleasing appearance. Landscaping not only makes the area attractive, it shades the home from summer sun and can form a windscreen in winter. A community center is essential, not only for laundry and meeting facilities, but also to provide a storm shelter for residents. This series of design recommendations shows how mobile home living can be improved and gives estimated costs for each site recommendation. HUD should encourage lenders to make longer - term loans and to make loans for improvements. HUD should also help local governments appreciate the importance of mobile homes to low and moderate income people and help them draft ordinances and standards for mobile home parks. Brochures, workshops, and technical assistance are also recommended. The report contains drawings, charts, draft minimum design standards, and a draft local mobile home ordinance.

PB80-171937 PC **A21**/MF **A01**
Urban Research and Development Corp., Bethlehem, PA.
Mobile Home Site, Park and Subdivision Design Criteria. Guidelines for Improving the Mobile Home Living Environment (Task IV C).
Technical rept.
Oct 77, 485p HUD-0000676
Contract HUD-H-2635

Mobile homes can be placed on individual lots, arranged on a tract of land with lots rented to residents (mobile home park), arranged on lots which are sold to residents (mobile home subdivision), or arranged on a tract of land under common ownership (mobile home condominium). Of these, the subdivision seems to generate the greatest pride in appearance. Most mobile homes on individual lots are found in small towns and rural areas and generally conform to the same zoning and appearance standards applied to conventional dwellings. The greatest problems in living environment come when groups of mobile homes are arranged on a tract of land. The characteristics which affect the livability of these groupings are the amount and arrangement of exterior space, surrounding land use, existing natural features, landscaping, roads and parking, utility distribution systems and the tie of mobile homes to the site, accessories, and community facilities. A series of design suggestions illustrate ways these elements can be combined to create pleasant mobile home communities. Imaginative site planning, privacy fences, landscaping, and well - designed laundry and community facilities all enhance the area. Mobile home communities are quite compatible with townhouse developments or other moderate density housing and should be included in a community's overall housing plans. These guidelines contain drawings, technical specifications, cost estimates, and draft local zoning codes and site standards.

PB80-171945 PC **A08**/MF **A01**
Bureau of the Census, Washington, DC. Housing Div.
Annual Housing Survey: 1973. United States and Regions. Part A: General Housing Characteristics.
Elmo E. Beach, Aneda E. France, and George Spraggins. Jul 75, 164p HUD-0000678

A series of tables contain statistics on the size and composition of the United States housing inventory, the characteristics of occupants, changes resulting from new construction and from losses, indicators of housing and neighborhood quality, and

the characteristics of recent movers. Text and tables summarize the highlights of the survey while additional tables give detailed breakdowns by region and by race of occupant. In October 1973, there were 75,969,000 housing units in the United States. About 91 percent, or 69.3 million, were occupied while the remaining 6.6 million were vacant. An estimated 51.1 million units, or 67 percent, were inside standard metropolitan statistical areas, about the same percentage as in 1970. However, during this 3 - year period suburban units increased from 51.2 percent to 52.8 percent. The period also saw an increase in total housing stock with 8 million units built while 2.2 million were either demolished or removed by natural disaster or some other means. Single - family homes accounted for 68 percent of all year - round housing, multiunit structures for 28 percent, and mobile homes and trailers for 4 percent. The tables provide detailed breakdowns of value of units, gross rents, income of owner or renter, housing characteristics, and occupant characteristics. Appendices give the study methodology and a copy of the survey questionnaire.

PB80-171952 PC **A07**/MF **A01**
Bureau of the Census, Washington, DC. Housing Div.
Annual Housing Survey: 1973. United States and Regions. Part B: Indicators of Housing and Neighborhood Quality.
Elmo E. Beach, Aneda E. France, and George Spraggins. Aug 75, 148p HUD-0000679

Most of the indicators of housing quality collected in this special HUD survey have not been collected in previous Bureau of the Census surveys and censuses. They include water leakage in basement and roof; the physical condition of interior ceilings, floors, and stairways; breakdowns or failures in plumbing facilities and equipment; number of working electrical outlets; measures of neighborhood quality such as the presence of heavy street traffic and noise; and the inadequacy of neighborhood services such as public transportation. Text and tables summarize the findings while detailed statistical tables give breakdowns by region of the United States and by race of occupant. Renters were more likely to report water leakage from the roof, the presence of open cracks or holes, and broken plaster and peeling paint. The proportion of units with 1.01 persons per room decreased from 11.5 percent in 1960 to 8 percent in 1970 and 5.6 percent in 1973. Of the owner - occupied homes which had at least one bedroom lacking privacy, nearly two - thirds were in rural areas; of the renter - occupied homes with a bedroom lacking privacy, about half were in rural areas. Overall about 9.4 percent of owner - occupied houses and 15.6 percent of renter occupied homes had such a lack of privacy. In general, families with a black head of household reported greater conditions of deterioration, more undesirable street conditions, and inadequate services. Graphs, a copy of the survey instrument, and appendices explaining the study methodology are provided.

PB80-171960 MF **A01**
Bureau of the Census, Washington, DC. Housing Div.
Annual Housing Survey: 1976. United States and Regions. Part B: Indicators of Housing and Neighborhood Quality.
Elmo E. Beach, Jane S. Maynard, and Edward D. Montfort. Jan 78, 189p HUD-0000739
Paper copy available from the Sup. of Docs., Stock number 003-024-01931-1.

This report presents statistical data for 1976 occupancy and utilization characteristics and services available, selected structural characteristics by deficiencies, failures in plumbing facilities and equipment, and selected neighborhood characteristics. Statistical tables are presented for the United States as a whole, for individual regions of the United States (Northeast, North Central, South, and West), and for a combined regional breakdown of certain indicators. The data also are classified by racial groupings: (1) all races, (2) blacks, and (3) Hispanics. This report is one of a series of 25 presenting data from the 1976 Annual Housing Survey sponsored by HUD and carried out by the U.S. Census Bureau. Data were obtained from a survey of 82,000 housing units. The sample was selected from units enumerated in the 1970 census and updated to include units constructed since 1970. Data were collected by trained census interviewers who spoke with the occupants of the sample unit, or if the unit was vacant, from informed persons such as landlords or neighbors. Appendices include area classifications, definitions, and explanations of subject characteristics; and sources and reliability of the estimates.

PB80-171978 MF **A01**
Bureau of the Census, Washington, DC. Housing Div.
Annual Housing Survey: 1976. United States and Regions. Part C: Financial Characteristics of the Housing Inventory.
Elmo E. Beach, Jane S. Maynard, and Edward D. Montfort. Feb 78, 272p HUD-0000740
Paper copy available from the Sup. of Docs., Stock number 003-024-01932-9.

This report presents statistical data on the 1976 income of families and primary individuals in owner - occupied and renter - occupied units, on the value of owner - occupied housing units, and on gross rent of renter - occupied housing units. The section presenting figures for the whole United States include data on households with black heads, households with Hispanic heads, and a composite section on the general American population. The sections on the following regions (Northeast, North Central, South, and West), present data on the general American population without a further breakdown by minority grouping. This report is one of a series of 25 presenting data from the 1976 Annual Housing Survey sponsored by HUD and carried out by the U.S. Census Bureau. Information was obtained from a survey of 82,000 housing units. The sample was selected from units enumerated in the 1970 census, and it was updated to include units constructed since 1970. Data were collected by trained census interviewers who spoke with the occupants of the sample unit or, if the unit was vacant, obtained the information from informed persons such as landlords or neighbors. Appendices include area classifications, definitions, and explanations of subject characteristics, and sources and reliability of the estimates.

PB80-171986 MF **A01**
Bureau of the Census, Washington, DC. Housing Div.
Annual Housing Survey: 1976. United States and Regions. Part D: Housing Characteristics of Recent Movers.
Elmo E. Beach, Jane S. Maynard, and Edward D. Montfort. Jan 78, 161p HUD-0000741
Paper copy available from the Sup. of Docs., Stock number 003-024-01933-7.

Statistical data on selected housing characteristics of recent movers are presented in this segment of HUD's 1976 Annual Housing Survey. Detailed information is provided on such topics as characteristics of units occupied by recent movers, characteristics of head of household, plumbing facilities in present unit, persons per room of present unit compared to previous unit, number of bedrooms, value and location of present property compared to the previous property, gross rent, and number of units in a structure. Tables give statistics for the United States as a whole, for the Northeast, North Central, South, and West regions. The data cover the total population, the black population, and the Hispanic population. One of a series of 25 reports presenting data from the 1976 Annual Housing Survey, the document contains data from a survey of 82,000 housing units. Selected from units enumerated in the 1970 census, the sample was updated to include units constructed since 1970. Data were collected by trained census interviewers who spoke with the occupants of the sample unit, or if the unit was vacant, obtained the information from landlords or neighbors. Appendices contain area classifications, definitions, and explanations of subject characteristics, sources and reliability of the estimates, and a revised table showing the main reason for moving into the present housing unit in 1975.

PB80-171994 MF **A01**
Bureau of the Census, Washington, DC. Housing Div.
Annual Housing Survey: 1976. United States and Regions. Part E: Urban and Rural Housing Characteristics.
Elmo E. Beach, Jane S. Maynard, and Edward D. Montfort. Mar 78, 222p HUD-0000742
Paper copy available from the Sup. of Docs., Stock number 003-024-01483-1.

This report presents comparative 1970 and 1976 statistical data on financial and other characteristics of the housing inventory. Data also are presented for 1976 housing occupancy and use characteristics and services available, selected structural characteristics by deficiencies, failures in plumbing facilities and equipment, selected neighborhood characteristics, and selected characteristics of year - round vacant housing units. The statistics for the country as a whole are broken down for the general population, households with a black head, and households with a Hispanic head. Statistical tables for the Northeast, North Central, and West present data for the general population and the section on the South presents data on housing units with black heads, in addition to general population figures. This report is one of a series of 25 presenting data from the 1976 Annual Housing Survey sponsored by HUD and carried out by the U.S. Census Bureau. Information was obtained from a survey of 82,000 housing units. The sample was selected from units enumerated in the 1970 census, and it was updated to include units constructed since 1970. Data were collected by trained census interviewers. Appendices include area classifications, definitions, and explanations of subject characteristics, sources and reliability of the estimates, corrected table of estimated housing units existing in 1973 which were removed by 1975, and a revised table presenting the main reason for moving into the present unit as of 1975.

PB80-172000 MF **A01**
Bureau of the Census, Washington, DC. Housing Div.
Annual Housing Survey: 1976. Housing Characteristics for Selected Metropolitan Areas: Allentown-Bethlehem-Easton, Pennsylvania-New Jersey. Standard Metropolitan Statistical Area.
Elmo E. Beach, Jane S. Maynard, and Edward D. Monfort. Oct 78, 299p HUD-0000744
Paper copy available from the Sup. of Docs., Stock number 003-024-01562-5.

Statistics are presented on neighborhood and housing and household characteristics obtained from the 1976 - 1977 annual housing survey conducted in the Allentown - Bethlehem - Easton, Pa. - N.J. region, 1 of 20 standard metropolitan statistical areas (SMSA's) selected for study by HUD. The survey was designed to provide timely data on a variety of housing concerns. Initial tables on general housing characteristics present data on all housing units in the area, new construction, units removed from the housing inventory, and owner - occupied or renter - occupied housing with Black or Spanish - surnamed heads of household. Tables of housing and neighborhood quality indicators center around occupancy and use characteristics and the availability of such services as garbage collection, housing deficiencies, failures in plumbing facilities and equipment, and selected neighborhood characteristics. Other tables cover the characteristics of owner - occupied and renter - occupied housing by family or primary individual income, the characteristics of owner - occupied housing by property value, and the characteristics of renter - occupied units by gross rent. Additional tables present data on the characteristics of all occupied housing units and units occupied by recent movers (i.e., households that moved into their units during the prior 12 months). The characteristics of the present unit for recent movers are cross - classified by the characteristics of the previous unit. The final group of tables presents data on the financial characteristics of all occupied housing units in terms of such indicators of housing and neighborhood quality as tenure, occupancy, structural deficiencies, failures in plumbing facilities and equipment, and selected neighborhood characteristics. Throughout the report, data are grouped by the general population and broken down for black and Spanish heads of household. Area classifications, definitions, and explanations of subject characteristics are appended, along with information on the source and reliability of the survey estimates. A table - finding guide is also provided.

PB80-172018 MF **A01**
Bureau of the Census, Washington, DC. Housing Div.

Annual Housing Survey: 1976. Housing Characteristics for Selected Metropolitan Areas: Baltimore, Maryland. Standard Metropolitan Statistical Area.
Elmo E. Beach, Jane S. Maynard, and Edward D. Monfort. Oct 78, 390p HUD-0000745
Paper copy available from the Sup. of Docs., Stock number 003-024-01563-3.

Statistics are presented on neighborhood and housing and household characteristics obtained from the 1976 - 1977 annual housing survey conducted in the Baltimore, Md., region, 1 of 20 standard metropolitan statistical areas (SMSA's) selected for study by HUD. The survey was designed to provide timely data on a variety of housing concerns. Initial tables on general housing characteristics present data on all housing units in the area, new construction, units removed from the housing inventory, and owner - occupied or renter - occupied housing with Black or Spanish - surnamed heads of household. Tables of housing and neighborhood quality indicators center around occupancy and use characteristics and the availability of such services as garbage collection, housing deficiencies, failures in plumbing facilities and equipment, and selected neighborhood characteristics. Other tables cover the characteristics of owner - occupied and renter - occupied housing by family or primary individual income, the characteristics of owner - occupied housing by property value, and the characteristics of renter - occupied units by gross rent. Additional tables present data on the characteristics of all occupied housing units and units occupied by recent movers (i.e., households that moved into their units during the prior 12 months). The characteristics of the present unit for recent movers are cross - classified by the characteristics of the previous unit. The final group of tables presents data on the financial characteristics of all occupied housing units in terms of such indicators of housing and neighborhood quality as tenure, occupancy, structural deficiencies, failures in plumbing facilities and equipment, and selected neighborhood characteristics. Throughout the report, data are grouped by the general population and broken down for black and Spanish heads of household. Area classifications, definitions, and explanations of subject characteristics are appended, along with information on the source and reliability of the survey estimates. A table - finding guide is also provided.

PB80-172026 MF **A01**
Bureau of the Census, Washington, DC. Housing Div.
Annual Housing Survey: 1976. Housing Characteristics for Selected Metropolitan Areas: Birmingham, Alabama. Standard Metropolitan Statistical Area.
Elmo E. Beach, Jane S. Maynard, and Edward D. Monfort. Oct 78, 387p HUD-0000746
Paper copy available from the Sup. of Docs., Stock number 003-024-01564-1.

Statistics are presented on neighborhood and housing and household characteristics obtained from the 1976 - 1977 annual housing survey conducted in the Birmingham, Ala., region, 1 of 20 standard metropolitan statistical areas (SMSA's) selected for study by HUD. The survey was designed to provide timely data on a variety of housing concerns. Initial tables on general housing characteristics present data on all housing units in the area, new construction, units removed from the housing inventory, and owner - occupied or renter - occupied housing with Black or Spanish - surnamed heads of household. Tables of housing and neighborhood quality indicators center around occupancy and use characteristics and the availability of such services as garbage collection, housing deficiencies, failures in plumbing facilities and equipment, and selected neighborhood characteristics. Other tables cover the characteristics of owner - occupied and renter - occupied housing by family or primary individual income, the characteristics of owner - occupied housing by property value, and the characteristics of renter - occupied units by gross rent. Additional tables present data on the characteristics of all occupied housing units and units occupied by recent movers (i.e., households that moved into their units during the prior 12 months). The characteristics of the present unit for recent movers are cross - classified by the characteristics of the previous unit. The final group of tables presents data on the financial characteristics of all occupied housing units in terms of such indicators of housing and neighborhood quality as tenure, occupancy, structural deficiencies, failures in plumbing facilities and equipment, and selected neighborhood characteristics. Throughout the report, data are grouped by the general population and broken down for black and Spanish heads of household. Area classifications, definitions, and explanations of subject characteristics are appended, along with information on the source and reliability of the survey estimates. A table - finding guide is also provided.

PB80-172034 MF **A01**
Bureau of the Census, Washington, DC. Housing Div.
Annual Housing Survey: 1976. Housing Characteristics for Selected Metropolitan Areas: Buffalo, New York. Standard Metropolitan Statistical Area.
Elmo E. Beach, Jane S. Maynard, and Edward D. Monfort. Oct 78, 369p HUD-0000747
Paper copy available from the Sup. of Docs., Stock number 003-024-01565-0.

Statistics are presented on neighborhood and housing and household characteristics obtained from the 1976 - 1977 annual housing survey conducted in the Buffalo, N.Y., region, 1 of 20 standard metropolitan statistical areas (SMSA's) selected for study by HUD. The survey was designed to provide timely data on a variety of housing concerns. Initial tables on general housing characteristics present data on all housing units in the area, new construction, units removed from the housing inventory, and owner - occupied or renter - occupied housing with Black or Spanish - surnamed heads of household. Tables of housing and neighborhood quality indicators center around occupancy and use characteristics and the availability of such services as garbage collection, housing deficiencies, failures in plumbing facilities and equipment, and selected neighborhood characteristics. Other tables cover the characteristics of owner - occupied and renter - occupied housing by family or primary individual income, the characteristics of owner - occupied housing by property value, and the characteristics of renter - occupied units by gross rent. Additional tables present data on the characteristics of all occupied housing units and units occupied by recent movers (i.e., households that moved into their units during the prior 12 months). The characteristics of the present unit for recent movers are cross - classified by the characteristics of the previous unit. The final group of tables presents data on the financial characteristics of all occupied housing units in terms of such indicators of housing and neighborhood quality as tenure, occupancy, structural deficiencies, failures in plumbing facilities and equipment, and selected neighborhood characteristics. Throughout the report, data are grouped by the general population and broken down for black and Spanish heads of household. Area classifications, definitions, and explanations of subject characteristics are appended, along with information on the source and reliability of the survey estimates. A table - finding guide is also provided.

PB80-172042 MF **A01**
Bureau of the Census, Washington, DC. Housing Div.
Annual Housing Survey: 1976. Housing Characteristics for Selected Metropolitan Areas: Cleveland, Ohio Standard Metropolitan Statistical Area.
Elmo E. Beach, Jane S. Maynard, and Edward D. Monfort. Oct 78, 414p HUD-0000748
Paper copy available from the Sup. of Docs., Stock number 003-024-01566-8.

Statistics are presented on neighborhood and housing and household characteristics obtained from the 1976 - 1977 annual housing survey conducted in the Cleveland, Ohio, region, 1 of 20 standard metropolitan statistical areas (SMSA's) selected for study by HUD. The survey was designed to provide timely data on a variety of housing concerns. Initial tables on general housing characteristics present data on all housing units in the area, new construction, units removed from the housing inventory, and owner - occupied or renter - occupied housing with Black or Spanish - surnamed heads of household. Tables of housing and neighborhood quality indicators center around occupancy and use characteristics and the availability of such services as garbage collection, housing deficiencies, failures in plumbing facilities and equipment, and selected neighborhood characteristics. Other tables cover the characteristics of owner - occupied and renter - occupied housing by family or primary individual income, the characteristics of owner - occupied housing by property value, and the characteristics of renter - occupied units by gross rent. Additional tables present data on the characteristics of all occupied housing units and units occupied by recent movers (i.e., households that moved into their units during the prior 12 months). The characteristics of the present unit for recent movers are cross - classified by the characteristics of the previous unit. The final group of tables presents data on the financial characteristics of all occupied housing units in terms of such indicators of housing and neighborhood quality as tenure, occupancy, structural deficiencies, failures in plumbing facilities and equipment, and selected neighborhood characteristics. Throughout the report, data are grouped by the general population and broken down for black and Spanish heads of household. Area classifications, definitions, and explanations of subject characteristics are appended, along with information on the source and reliability of the survey estimates. A table - finding guide is also provided.

PB80-172059 MF **A01**
Bureau of the Census, Washington, DC. Housing Div.
Annual Housing Survey: 1976. Housing Characteristics for Selected Metropolitan Areas: Denver, Colorado. Standard Metropolitan Statistical Area.
Elmo E. Beach, Jane S. Maynard, and Edward D. Monfort. Oct 78, 490p HUD-0000749
Paper copy available from the Sup. of Docs., Stock number 003-024-01567-6.

Statistics are presented on neighborhood and housing and household characteristics obtained from the 1976 - 1977 annual housing survey conducted in the Denver, Colo., region, 1 of 20 standard metropolitan statistical areas (SMSA's) selected for study by HUD. The survey was designed to provide timely data on a variety of housing concerns. Initial tables on general housing characteristics present data on all housing units in the area, new construction, units removed from the housing inventory, and owner - occupied or renter - occupied housing with Black or Spanish - surnamed heads of household. Tables of housing and neighborhood quality indicators center around occupancy and use characteristics and the availability of such services as garbage collection, housing deficiencies, failures in plumbing facilities and equipment, and selected neighborhood characteristics. Other tables cover the characteristics of owner - occupied and renter - occupied housing by family or primary individual income, the characteristics of owner - occupied housing by property value, and the characteristics of renter - occupied units by gross rent. Additional tables present data on the characteristics of all occupied housing units and units occupied by recent movers (i.e., households that moved into their units during the prior 12 months). The characteristics of the present unit for recent movers are cross - classified by the characteristics of the previous unit. The final group of tables presents data on the financial characteristics of all occupied housing units in terms of such indicators of housing and neighborhood quality as tenure, occupancy, structural deficiencies, failures in plumbing facilities and equipment, and selected neighborhood characteristics. Throughout the report, data are grouped by the general population and broken down for black and Spanish heads of household. Area classifications, definitions, and explanations of subject characteristics are appended, along with information on the source and reliability of the survey estimates. A table - finding guide is also provided.

PB80-172067 MF **A01**
Bureau of the Census, Washington, DC. Housing Div.
Annual Housing Survey: 1976. Housing Characteristics for Selected Metropolitan Areas: Grand Rapids, Michigan. Standard Metropolitan Statistical Area.
Elmo E. Beach, Jane S. Maynard, and Edward D. Monfort. Oct 78, 380p HUD-0000750

Paper copy available from the Sup. of Docs., Stock number 003-024-01568-4.

Statistics are presented on neighborhood and housing and household characteristics obtained from the 1976 - 1977 annual housing survey conducted in the Grand Rapids, Mich., region, 1 of 20 standard metropolitan statistical areas (SMSA's) selected for study by HUD. The survey was designed to provide timely data on a variety of housing concerns. Initial tables on general housing characteristics present data on all housing units in the area, new construction, units removed from the housing inventory, and owner - occupied or renter - occupied housing with Black or Spanish - surnamed heads of household. Tables of housing and neighborhood quality indicators center around occupancy and use characteristics and the availability of such services as garbage collection, housing deficiencies, failures in plumbing facilities and equipment, and selected neighborhood characteristics. Other tables cover the characteristics of owner - occupied and renter - occupied housing by family or primary individual income, the characteristics of owner - occupied housing by property value, and the characteristics of renter - occupied units by gross rent. Additional tables present data on the characteristics of all occupied housing units and units occupied by recent movers (i.e., households that moved into their units during the prior 12 months). The characteristics of the present unit for recent movers are cross - classified by the characteristics of the previous unit. The final group of tables presents data on the financial characteristics of all occupied housing units in terms of such indicators of housing and neighborhood quality as tenure, occupancy, structural deficiencies, failures in plumbing facilities and equipment, and selected neighborhood characteristics. Throughout the report, data are grouped by the general population and broken down for black and Spanish heads of household. Area classifications, definitions, and explanations of subject characteristics are appended, along with information on the source and reliability of the survey estimates. A table - finding guide is also provided.

PB80-172075 MF **A01**
Bureau of the Census, Washington, DC. Housing Div.
Annual Housing Survey: 1976. Housing Characteristics for Selected Metropolitan Areas: Honolulu, Hawaii Standard Metropolitan Statistical Area.
Elmo E. Beach, Jane S. Maynard, and Edward D. Monfort. Oct 78, 354p HUD-0000751
Paper copy available from the Sup. of Docs., Stock number 003-024-01569-2.

Statistics are presented on neighborhood and housing and household characteristics obtained from the 1976 - 1977 annual housing survey conducted in the Honolulu, Hawaii region, 1 of 20 standard metropolitan statistical areas (SMSA's) selected for study by HUD. The survey was designed to provide timely data on a variety of housing concerns. Initial tables on general housing characteristics present data on all housing units in the area, new construction, units removed from the housing inventory, and owner - occupied or renter - occupied housing with Black or Spanish - surnamed heads of household. Tables of housing and neighborhood quality indicators center around occupancy and use characteristics and the availability of such services as garbage collection, housing deficiencies, failures in plumbing facilities and equipment, and selected neighborhood characteristics. Other tables cover the characteristics of owner - occupied and renter - occupied housing by family or primary individual income, the characteristics of owner - occupied housing by property value, and the characteristics of renter - occupied units by gross rent. Additional tables present data on the characteristics of all occupied housing units and units occupied by recent movers (i.e., households that moved into their units during the prior 12 months). The characteristics of the present unit for recent movers are cross - classified by the characteristics of the previous unit. The final group of tables presents data on the financial characteristics of all occupied housing units in terms of such indicators of housing and neighborhood quality as tenure, occupancy, structural deficiencies, failures in plumbing facilities and equipment, and selected neighborhood characteristics. Throughout the report, data are grouped by the general population and broken down for black and Spanish heads of household. Area classifications, definitions, and explanations of subject characteristics are appended, along with information on the source and reliability of the survey estimates. A table - finding guide is also provided.

PB80-172083 MF **A01**
Bureau of the Census, Washington, DC. Housing Div.
Annual Housing Survey: 1976. Housing Characteristics for Selected Metropolitan Areas: Houston, Texas. Standard Metropolitan Statistical Area.
Elmo E. Beach, Jane S. Maynard, and Edward D. Monfort. Aug 78, 532p HUD-0000752
Paper copy available from the Sup. of Docs., Stock number 003-024-01570-6.

Statistics are presented on neighborhood and housing and household characteristics obtained from the 1976 - 1977 annual housing survey conducted in the Houston, Tex., region, 1 of 20 standard metropolitan statistical areas (SMSA's) selected for study by HUD. The survey was designed to provide timely data on a variety of housing concerns. Initial tables on general housing characteristics present data on all housing units in the area, new construction, units removed from the housing inventory, and owner - occupied or renter - occupied housing with Black or Spanish - surnamed heads of household. Tables of housing and neighborhood quality indicators center around occupancy and use characteristics and the availability of such services as garbage collection, housing deficiencies, failures in plumbing facilities and equipment, and selected neighborhood characteristics. Other tables cover the characteristics of owner - occupied and renter - occupied housing by family or primary individual income, the characteristics of owner - occupied housing by property value, and the characteristics of renter - occupied units by gross rent. Additional tables present data on the characteristics of all occupied housing units and units occupied by recent movers (i.e., households that moved into their units during the prior 12 months). The characteristics of the present unit for recent movers are cross - classified by the characteristics of the previous unit. The final group of tables presents data on the financial characteristics of all occupied housing units in terms of such indicators of housing and neighborhood quality as tenure, occupancy, structural deficiencies, failures in plumbing facilities and equipment, and selected neighborhood characteristics. Throughout the report, data are grouped by the general population and broken down for black and Spanish heads of household. Area classifications, definitions, and explanations of subject characteristics are appended, along with information on the source and reliability of the survey estimates. A table - finding guide is also provided.

PB80-172091 MF **A01**
Bureau of the Census, Washington, DC. Housing Div.
Annual Housing Survey: 1976. Housing Characteristics for Selected Metropolitan Areas: Indianapolis, Indiana. Standard Metropolitan Statistical Area.
Elmo E. Beach, Jane S. Maynard, and Edward D. Monfort. Sep 78, 344p HUD-0000753
Paper copy available from the Sup. of Docs., Stock number 003-024-01571-4.

Statistics are presented on neighborhood and housing and household characteristics obtained from the 1976 - 1977 annual housing survey conducted in the Indianapolis, Ind., region, 1 of 20 standard metropolitan statistical areas (SMSA's) selected for study by HUD. The survey was designed to provide timely data on a variety of housing concerns. Initial tables on general housing characteristics present data on all housing units in the area, new construction, units removed from the housing inventory, and owner - occupied or renter - occupied housing with Black or Spanish - surnamed heads of household. Tables of housing and neighborhood quality indicators center around occupancy and use characteristics and the availability of such services as garbage collection, housing deficiencies, failures in plumbing facilities and equipment, and selected neighborhood characteristics. Other tables cover the characteristics of owner - occupied and renter - occupied housing by family or primary individual income, the characteristics of owner - occupied housing by property value, and the characteristics of renter - occupied units by gross rent. Additional tables present data on the characteristics of all occupied housing units and units occupied by recent movers (i.e., households that moved into their units during the prior 12 months). The characteristics of the present unit for recent movers are cross - classified by the characteristics of the previous unit. The final group of tables presents data on the financial characteristics of all occupied housing units in terms of such indicators of housing and neighborhood quality as tenure, occupancy, structural deficiencies, failures in plumbing facilities and equipment, and selected neighborhood characteristics. Throughout the report, data are grouped by the general population and broken down for black and Spanish heads of household. Area classifications, definitions, and explanations of subject characteristics are appended, along with information on the source and reliability of the survey estimates. A table - finding guide is also provided.

PB80-172109 MF **A01**
Bureau of the Census, Washington, DC. Housing Div.
Annual Housing Survey: 1976. Housing Characteristics for Selected Metropolitan Areas: Las Vegas, Nevada. Standard Metropolitan Statistical Area.
Elmo E. Beach, Jane S. Maynard, and Edward D. Montfort. Sep 78, 521p HUD-0000754
Paper copy available from the Sup. of Docs., Stock number 003-024-01572-2.

Statistics are presented on neighborhood and housing and household characteristics obtained from the 1976 - 1977 annual housing survey conducted in the Las Vegas, Nev., region, 1 of 20 standard metropolitan statistical areas (SMSA's) selected for study by HUD. The survey was designed to provide timely data on a variety of housing concerns. Initial tables on general housing characteristics present data on all housing units in the area, new construction, units removed from the housing inventory, and owner - occupied or renter - occupied housing with Black or Spanish - surnamed heads of household. Tables of housing and neighborhood quality indicators center around occupancy and use characteristics and the availability of such services as garbage collection, housing deficiencies, failures in plumbing facilities and equipment, and selected neighborhood characteristics. Other tables cover the characteristics of owner - occupied and renter - occupied housing by family or primary individual income, the characteristics of owner - occupied housing by property value, and the characteristics of renter - occupied units by gross rent. Additional tables present data on the characteristics of all occupied housing units and units occupied by recent movers (i.e., households that moved into their units during the prior 12 months). The characteristics of the present unit for recent movers are cross - classified by the characteristics of the previous unit. The final group of tables presents data on the financial characteristics of all occupied housing units in terms of such indicators of housing and neighborhood quality as tenure, occupancy, structural deficiencies, failures in plumbing facilities and equipment, and selected neighborhood characteristics. Throughout the report, data are grouped by the general population and broken down for black and Spanish heads of household. Area classifications, definitions, and explanations of subject characteristics are appended, along with information on the source and reliability of the survey estimates. A table - finding guide is also provided.

PB80-172117 MF **A01**
Bureau of the Census, Washington, DC. Housing Div.
Annual Housing Survey: 1976. Housing Characteristics for Selected Metropolitan Areas: Louisville, Kentucky-Indiana. Standard Metropolitan Statistical Area.
Elmo E. Beach, Jane S. Maynard, and Edward D. Montfort. Oct 78, 387p HUD-0000755
Paper copy available from the Sup. of Docs., Stock number 003-024-01573-1.

Statistics are presented on neighborhood and housing and household characteristics obtained from the 1976 - 1977 annual housing survey con-

ducted in the Louisville, Ky. - Ind., region, 1 of 20 standard metropolitan statistical areas (SMSA's) selected for study by HUD. The survey was designed to provide timely data on a variety of housing concerns. Initial tables on general housing characteristics present data on all housing units in the area, new construction, units removed from the housing inventory, and owner - occupied or renter - occupied housing with Black or Spanish - surnamed heads of household. Tables of housing and neighborhood quality indicators center around occupancy and use characteristics and the availability of such services as garbage collection, housing deficiencies, failures in plumbing facilities and equipment, and selected neighborhood characteristics. Other tables cover the characteristics of owner - occupied and renter - occupied housing by family or primary individual income, the characteristics of owner - occupied housing by property value, and the characteristics of renter - occupied units by gross rent. Additional tables present data on the characteristics of all occupied housing units and units occupied by recent movers (i.e., households that moved into their units during the prior 12 months). The characteristics of the present unit for recent movers are cross - classified by the characteristics of the previous unit. The final group of tables presents data on the financial characteristics of all occupied housing units in terms of such indicators of housing and neighborhood quality as tenure, occupancy, structural deficiencies, failures in plumbing facilities and equipment, and selected neighborhood characteristics. Throughout the report, data are grouped by the general population and broken down for black and Spanish heads of household. Area classifications, definitions, and explanations of subject characteristics are appended, along with information on the source and reliability of the survey estimates. A table - finding guide is also provided.

PB80-172125 MF **A01**
Bureau of the Census, Washington, DC. Housing Div.
Annual Housing Survey: 1976. Housing Characteristics for Selected Metropolitan Areas: New York, New York. Standard Metropolitan Statistical Area.
Elmo E. Beach, Jane S. Maynard, and Edward D. Montfort. Sep 78, 526p HUD-0000756
Paper copy available from the Sup. of Docs., Stock number 003-024-01574-9.

Statistics are presented on neighborhood and housing and household characteristics obtained from the 1976 - 1977 annual housing survey conducted in the New York, N.Y., region, 1 of 20 standard metropolitan statistical areas (SMSA's) selected for study by HUD. The survey was designed to provide timely data on a variety of housing concerns. Initial tables on general housing characteristics present data on all housing units in the area, new construction, units removed from the housing inventory, and owner - occupied or renter - occupied housing with Black or Spanish - surnamed heads of household. Tables of housing and neighborhood quality indicators center around occupancy and use characteristics and the availability of such services as garbage collection, housing deficiencies, failures in plumbing facilities and equipment, and selected neighborhood characteristics. Other tables cover the characteristics of owner - occupied and renter - occupied housing by family or primary individual income, the characteristics of owner - occupied housing by property value, and the characteristics of renter - occupied units by gross rent. Additional tables present data on the characteristics of all occupied housing units and units occupied by recent movers (i.e., households that moved into their units during the prior 12 months). The characteristics of the present unit for recent movers are cross - classified by the characteristics of the previous unit. The final group of tables presents data on the financial characteristics of all occupied housing units in terms of such indicators of housing and neighborhood quality as tenure, occupancy, structural deficiencies, failures in plumbing facilities and equipment, and selected neighborhood characteristics. Throughout the report, data are grouped by the general population and broken down for black and Spanish heads of household. Area classifications, definitions, and explanations of subject characteristics are appended, along with information on the source and reliability of the survey estimates. A table - finding guide is also provided.

PB80-172133 MF **A01**
Bureau of the Census, Washington, DC. Housing Div.
Annual Housing Survey: 1976. Housing Characteristics for Selected Metropolitan Areas: Oklahoma City, Oklahoma. Standard Metropolitan Statistical Area.
Elmo E. Beach, Jane S. Maynard, and Edward D. Montfort. Oct 78, 401p HUD-0000757
Paper copy available from the Sup. of Docs., Stock number 003-024-01575-7.

Statistics are presented on neighborhood and housing and household characteristics obtained from the 1976 - 1977 annual housing survey conducted in the Oklahoma City, Okla., region, 1 of 20 standard metropolitan statistical areas (SMSA's) selected for study by HUD. The survey was designed to provide timely data on a variety of housing concerns. Initial tables on general housing characteristics present data on all housing units in the area, new construction, units removed from the housing inventory, and owner - occupied or renter - occupied housing with Black or Spanish - surnamed heads of household. Tables of housing and neighborhood quality indicators center around occupancy and use characteristics and the availability of such services as garbage collection, housing deficiencies, failures in plumbing facilities and equipment, and selected neighborhood characteristics. Other tables cover the characteristics of owner - occupied and renter - occupied housing by family or primary individual income, the characteristics of owner - occupied housing by property value, and the characteristics of renter - occupied units by gross rent. Additional tables present data on the characteristics of all occupied housing units and units occupied by recent movers (i.e., households that moved into their units during the prior 12 months). The characteristics of the present unit for recent movers are cross - classified by the characteristics of the previous unit. The final group of tables presents data on the financial characteristics of all occupied housing units in terms of such indicators of housing and neighborhood quality as tenure, occupancy, structural deficiencies, failures in plumbing facilities and equipment, and selected neighborhood characteristics. Throughout the report, data are grouped by the general population and broken down for black and Spanish heads of household. Area classifications, definitions, and explanations of subject characteristics are appended, along with information on the source and reliability of the survey estimates. A table - finding guide is also provided.

PB80-172141 MF **A01**
Bureau of the Census, Washington, DC. Housing Div.
Annual Housing Survey: 1976. Housing Characteristics for Selected Metropolitan Areas: Omaha, Nebraska-Iowa Standard Metropolitan Statistical Area.
Elmo E. Beach, Jane S. Maynard, and Edward D. Montfort. Oct 78, 380p HUD-0000758
Paper copy available from the Sup. of Docs., Stock number 003-024-01576-5.

Statistics are presented on neighborhood and housing and household characteristics obtained from the 1976 - 1977 annual housing survey conducted in the Omaha, Nebr. - Iowa, region, 1 of 20 standard metropolitan statistical areas (SMSA's) selected for study by HUD. The survey was designed to provide timely data on a variety of housing concerns. Initial tables on general housing characteristics present data on all housing units in the area, new construction, units removed from the housing inventory, and owner - occupied or renter - occupied housing with Black or Spanish - surnamed heads of household. Tables of housing and neighborhood quality indicators center around occupancy and use characteristics and the availability of such services as garbage collection, housing deficiencies, failures in plumbing facilities and equipment, and selected neighborhood characteristics. Other tables cover the characteristics of owner - occupied and renter - occupied housing by family or primary individual income, the characteristics of owner - occupied housing by property value, and the characteristics of renter - occupied units by gross rent. Additional tables present data on the characteristics of all occupied housing units and units occupied by recent movers (i.e., households that moved into their units during the prior 12 months). The characteristics of the present unit for recent movers are cross - classified by the characteristics of the previous unit. The final group of tables presents data on the financial characteristics of all occupied housing units in terms of such indicators of housing and neighborhood quality as tenure, occupancy, structural deficiencies, failures in plumbing facilities and equipment, and selected neighborhood characteristics. Throughout the report, data are grouped by the general population and broken down for black and Spanish heads of household. Area classifications, definitions, and explanations of subject characteristics are appended, along with information on the source and reliability of the survey estimates. A table - finding guide is also provided.

PB80-172158 MF **A01**
Bureau of the Census, Washington, DC. Housing Div.
Annual Housing Survey: 1976. Housing Characteristics for Selected Metropolitan Areas: Providence-Pawtucket-Warwick, Rhode Island-Massachusetts. Standard Metrpolitan Statistical Area.
Elmo E. Beach, Jane S. Maynard, and Edward D. Montfort. Oct 78, 367p HUD-0000759
Paper copy available from the Sup. of Docs., Stock number 003-024-01577-3.

Statistics are presented on neighborhood and housing and household characteristics obtained from the 1976 - 1977 annual housing survey conducted in the Providence - Pawtucket - Warwick, R.I. - Mass., region, 1 of 20 standard metropolitan statistical areas (SMSA's) selected for study by HUD. The survey was designed to provide timely data on a variety of housing concerns. Initial tables on general housing characteristics present data on all housing units in the area, new construction, units removed from the housing inventory, and owner - occupied or renter - occupied housing with Black or Spanish - surnamed heads of household. Tables of housing and neighborhood quality indicators center around occupancy and use characteristics and the availability of such services as garbage collection, housing deficiencies, failures in plumbing facilities and equipment, and selected neighborhood characteristics. Other tables cover the characteristics of owner - occupied and renter - occupied housing by family or primary individual income, the characteristics of owner - occupied housing by property value, and the characteristics of renter - occupied units by gross rent. Additional tables present data on the characteristics of all occupied housing units and units occupied by recent movers (i.e., households that moved into their units during the prior 12 months). The characteristics of the present unit for recent movers are cross - classified by the characteristics of the previous unit. The final group of tables presents data on the financial characteristics of all occupied housing units in terms of such indicators of housing and neighborhood quality as tenure, occupancy, structural deficiencies, failures in plumbing facilities and equipment, and selected neighborhood characteristics. Throughout the report, data are grouped by the general population and broken down for black and Spanish heads of household. Area classifications, definitions, and explanations of subject characteristics are appended, along with information on the source and reliability of the survey estimates. A table - finding guide is also provided.

PB80-172166 MF **A01**
Bureau of the Census, Washington, DC. Housing Div.
Annual Housing Survey: 1976. Housing Characteristics for Selected Metropolitan Areas: Raleigh, North Carolina. Standard Metropolitan Statistical Area.
Elmo E. Beach, Jane S. Maynard, and Edward D. Montfort. Oct 78, 387p HUD-0000760
Paper copy available from the Sup. of Docs., Stock number 003-024-01578-1.

Statistics are presented on neighborhood and housing and household characteristics obtained from the 1976 - 1977 annual housing survey conducted in the Raleigh, N.C., region, 1 of 20 standard metropolitan statistical areas (SMSA's) selected for study by HUD. The survey was designed to provide timely data on a variety of housing concerns. Initial tables on general housing characteristics present data on all housing units in the area, new construction, units removed from the housing

inventory, and owner - occupied or renter - occupied housing with Black or Spanish - surnamed heads of household. Tables of housing and neighborhood quality indicators center around occupancy and use characteristics and the availability of such services as garbage collection, housing deficiencies, failures in plumbing facilities and equipment, and selected neighborhood characteristics. Other tables cover the characteristics of owner - occupied and renter - occupied housing by family or primary individual income, the characteristics of owner - occupied housing by property value, and the characteristics of renter - occupied units by gross rent. Additional tables present data on the characteristics of all occupied housing units and units occupied by recent movers (i.e., households that moved into their units during the prior 12 months). The characteristics of the present unit for recent movers are cross - classified by the characteristics of the previous unit. The final group of tables presents data on the financial characteristics of all occupied housing units in terms of such indicators of housing and neighborhood quality as tenure, occupancy, structural deficiencies, failures in plumbing facilities and equipment, and selected neighborhood characteristics. Throughout the report, data are grouped by the general population and broken down for black and Spanish heads of household. Area classifications, definitions, and explanations of subject characteristics are appended, along with information on the source and reliability of the survey estimates. A table - finding guide is also provided.

PB80-172174 MF **A01**
Bureau of the Census, Washington, DC. Housing Div.
Annual Housing Survey: 1976. Housing Characteristics for Selected Metropolitan Areas: Sacramento, California. Standard Metropolitan Statistical Area.
Elmo E. Beach, Jane S. Maynard, and Edward D. Montfort. Oct 78, 493p HUD-0000761
Paper copy available from the Sup. of Docs., Stock number 003-024-01579-0.

Statistics are presented on neighborhood and housing and household characteristics obtained from the 1976 - 1977 annual housing survey conducted in the Sacramento, Calif., region, 1 of 20 standard metropolitan statistical areas (SMSA's) selected for study by HUD. The survey was designed to provide timely data on a variety of housing concerns. Initial tables on general housing characteristics present data on all housing units in the area, new construction, units removed from the housing inventory, and owner - occupied or renter - occupied housing with Black or Spanish - surnamed heads of household. Tables of housing and neighborhood quality indicators center around occupancy and use characteristics and the availability of such services as garbage collection, housing deficiencies, failures in plumbing facilities and equipment, and selected neighborhood characteristics. Other tables cover the characteristics of owner - occupied and renter - occupied housing by family or primary individual income, the characteristics of owner - occupied housing by property value, and the characteristics of renter - occupied units by gross rent. Additional tables present data on the characteristics of all occupied housing units and units occupied by recent movers (i.e., households that moved into their units during the prior 12 months). The characteristics of the present unit for recent movers are cross - classified by the characteristics of the previous unit. The final group of tables presents data on the financial characteristics of all occupied housing units in terms of such indicators of housing and neighborhood quality as tenure, occupancy, structural deficiencies, failures in plumbing facilities and equipment, and selected neighborhood characteristics. Throughout the report, data are grouped by the general population and broken down for black and Spanish heads of household. Area classifications, definitions, and explanations of subject characteristics are appended, along with information on the source and reliability of the survey estimates. A table - finding guide is also provided.

PB80-172182 MF **A01**
Bureau of the Census, Washington, DC. Housing Div.
Annual Housing Survey: 1976. Housing Characteristics for Selected Metropolitan Areas: St. Louis, Missouri-Illinois. Standard Metropolitan Statistical Area.
Elmo E. Beach, Jane S. Maynard, and Edward D. Montfort. Aug 78, 431p HUD-0000762
Paper copy available from the Sup. of Docs., Stock number 003-024-01580-3.

Statistics are presented on neighborhood and housing and household characteristics obtained from the 1976 - 1977 annual housing survey conducted in the St. Louis, Mo. - Ill., region, 1 of 20 standard metropolitan statistical areas (SMSA's) selected for study by HUD. The survey was designed to provide timely data on a variety of housing concerns. Initial tables on general housing characteristics present data on all housing units in the area, new construction, units removed from the housing inventory, and owner - occupied or renter - occupied housing with Black or Spanish - surnamed heads of household. Tables of housing and neighborhood quality indicators center around occupancy and use characteristics and the availability of such services as garbage collection, housing deficiencies, failures in plumbing facilities and equipment, and selected neighborhood characteristics. Other tables cover the characteristics of owner - occupied and renter - occupied housing by family or primary individual income, the characteristics of owner - occupied housing by property value, and the characteristics of renter - occupied units by gross rent. Additional tables present data on the characteristics of all occupied housing units and units occupied by recent movers (i.e., households that moved into their units during the prior 12 months). The characteristics of the present unit for recent movers are cross - classified by the characteristics of the previous unit. The final group of tables presents data on the financial characteristics of all occupied housing units in terms of such indicators of housing and neighborhood quality as tenure, occupancy, structural deficiencies, failures in plumbing facilities and equipment, and selected neighborhood characteristics. Throughout the report, data are grouped by the general population and broken down for black and Spanish heads of household. Area classifications, definitions, and explanations of subject characteristics are appended, along with information on the source and reliability of the survey estimates. A table - finding guide is also provided.

PB80-172190 MF **A01**
Bureau of the Census, Washington, DC. Housing Div.
Annual Housing Survey: 1976. Housing Characteristics for Selected Metropolitan Areas: Seattle-Everett, Washington. Standard Metropolitan Statistical Area.
Elmo E. Beach, Jane S. Maynard, and Edward D. Montfort. Oct 78, 462p HUD-0000763
Paper copy available from the Sup. of Docs., Stock number 003-024-01581-1.

Statistics are presented on neighborhood and housing and household characteristics obtained from the 1976 - 1977 annual housing survey conducted in the Seattle - Everett, Wash., region, 1 of 20 standard metropolitan statistical areas (SMSA's) selected for study by HUD. The survey was designed to provide timely data on a variety of housing concerns. Initial tables on general housing characteristics present data on all housing units in the area, new construction, units removed from the housing inventory, and owner - occupied or renter - occupied housing with Black or Spanish - surnamed heads of household. Tables of housing and neighborhood quality indicators center around occupancy and use characteristics and the availability of such services as garbage collection, housing deficiencies, failures in plumbing facilities and equipment, and selected neighborhood characteristics. Other tables cover the characteristics of owner - occupied and renter - occupied housing by family or primary individual income, the characteristics of owner - occupied housing by property value, and the characteristics of renter - occupied units by gross rent. Additional tables present data on the characteristics of all occupied housing units and units occupied by recent movers (i.e., households that moved into their units during the prior 12 months). The characteristics of the present unit for recent movers are cross - classified by the characteristics of the previous unit. The final group of tables presents data on the financial characteristics of all occupied housing units in terms of such indicators of housing and neighborhood quality as tenure, occupancy, structural deficiencies, failures in plumbing facilities and equipment, and selected neighborhood characteristics. Throughout the report, data are grouped by the general population and broken down for black and Spanish heads of household. Area classifications, definitions, and explanations of subject characteristics are appended, along with information on the source and reliability of the survey estimates. A table - finding guide is also provided.

PB80-172315 PC **A03**/MF **A01**
RAND Corp., Santa Monica, CA.
Eligibility and Participation Research Plan for the Housing Assistance Supply Experiment.
Working note,
John E. Mulford, Grace E. Carter, and Phyllis L. Ellickson. Oct 78, 29p HUD-0000792
Contract HUD-H-1789

Analyses of the first 2 years of program data and the first two sets of landlord and household interviews conducted as part of the Housing Assistance Supply Experiment (HASE) indicate that the program helps participants but has little effect on others. This research plan will describe the population of eligible households, contrast their characteristics with those of ineligible households, and measure the participation of eligibles in the allowance program over time. The steps of household participation will be individually modeled to determine why households participate as they do. Differential participation by household type will be explained by differences in benefits and costs. Finally, individual models will be linked to predict overall participation rates, especially at steady - state. The population will be divided into four states to track households as they move into and out of eligibility and the allowance program: (1) not eligible for the program, (2) eligible, not enrolled, (3) enrolled, not receiving payments, and (4) enrolled, receiving payments. The research will also estimate the number of households in each state at different times, flow of households between states, and the distribution of durations of stay in each state. It will draw on surveys, program data, and household movements to explain participation rates of less than 50 percent. Tabular data are included. (Author abstract modified).

PB80-172323 PC **A03**/MF **A01**
RAND Corp., Santa Monica, CA.
Housing Assistance Supply Experiment. Executive Summary.
Annual rept. no. 4, Oct 76-Sep 77.
Mar 78, 28p HUD-0000795
Contract HUD-H-1789

The Housing Assistance Supply Experiment (HASE) deliberately picked two dissimilar markets to test the effects of direct housing assistance on recipients' choice of housing, the price of housing in the area, and dispersion of poor and minority families. Brown County, Wis., has a stable economy, good housing stock, and a homogeneous population. St. Joseph County, Ind., has a great deal of unemployment, a large black and Spanish - speaking minority population, and a deteriorating inner city (South Bend). Despite these differences, program experiences in both areas have been remarkably similar. About 7 percent of all households in Brown County and 8 percent in St. Joseph County are receiving payments. Through September 1977 (39 months of full program operation in Brown County and 30 months in St. Joseph County) the Brown County Housing Assistance Office had disbursed $6.1 million in allowance payments and St. Joseph County $6.4 million. The program has few eligibility restrictions except income, yet the characteristics of program participants have also been similar in the two markets with elderly persons and single parents making up the majority of participants. Younger persons with children participate for short periods of time to supplement unemployment benefits, but drop out after a few months. Few participants have moved to upgrade housing, and the effect on rents has been negligible. Most have brought existing housing up to standard or have convinced their landlords to do so; median cash outlay for repairs was $10. The program has been well administered and is well received.

PB80-172331 PC **A02**/MF **A01**
Urban Inst., Washington, DC.

Incomes and Housing: Some Insights from the Experimental Housing Allowance Program.
Marc Bendick, and James P. Zais. May 78, 25p
HUD-0000796
Contract HUD-H-2162R

The Experimental Housing Allowance Program has field tested the possible role of direct cash assistance in maintaining and expanding the housing stock, broadening housing choice for all families, and revitalizing the cities. The experiment found that neither cash assistance targeted toward housing expenditures nor improved general welfare payments provide significant progress toward these goals. In practice, households who receive housing assistance payments spend their increased purchasing power on items other than housing. (In both Pittsburgh, Pa., and Phoenix, Ariz., 71 percent of the subsidy was spent on other goods.) Households which would be forced by the program's standards to increase significantly their housing expenditures do not participate in the program. Assistance payments do bring units with minor deficiencies up to standard, and they also result in better maintenance of units which are already standard. However, the payments do not generate substantial repairs to the housing stock nor do they revitalize the neighborhoods occupied by the poor. Because of the lack of low - cost housing and the reluctance of families to spend more than the large proportion of the income already committed to housing (as much as 40 percent in some cases), the assistance does not lead to greater dispersal of the poor and minority outside their traditional residential areas. The problems of urban neighborhoods are so complex that a mix of programs must be used to combat nonresponsive housing markets, the inertia of decaying neighborhoods, and the legacy of discrimination. (Author abstract modified).

PB80-172349 PC **A16**/MF **A01**
Urban Systems Research and Engineering, Inc., Cambridge, MA.
Statistical Analysis of the Urban Homesteading Demonstration. Volume 2: Baseline Neighborhood and Housing Data.
Nov 77, 351p HUD-0000797
Contract HUD-H-2401

This collection of baseline data for the evaluation of the Urban Homesteading program is based on interviews with urban homestead households, a windshield survey of housing and block conditions in urban homestead neighborhoods, a rehabilitation audit, and a baseline survey of residents of urban homestead neighborhoods. The program covers 23 neighborhoods in 17 cities: Atlanta, Ga., Chicago, Ill., Cincinnati, Ohio, Columbus, Ohio, Dallas, Tex., Gary, Ind., Indianapolis, Ind., Islip, N.Y., Kansas City, Mo., Milwaukee, Wis., Minneapolis, Minn., Oakland, Calif., Philadelphia, Pa., Rockford, Ill., South Bend, Ind., Tacoma, Wash., and Wilmington, Del. The neighborhood resident baseline survey gathered information from a sample of 1,753 persons located in 22 of the 23 urban homestead sites, for a response rate of 70.1 percent. The mean household size was 3.4 persons; 65 percent were black, 3 percent Spanish - speaking and 31 percent white; and the mean age of the head of the household was 46.5 years. Most expected the neighborhood to stay the same or get worse during the next three years. Both surveys found that although the neighborhoods were basically good, the housing had some major and many minor defects. This collection of charts, statistical tables, and survey instruments gives all of the baseline information. The time - series analysis for the study will be carried out as the second and third waves of the survey are made available.

PB80-172356 PC **A02**/MF **A01**
Bureau of the Census, Washington, DC. Data User Services Div.
Data from the Annual Housing Survey. Data Access Descriptions.
Lawrence Hugg, and Jeanne Woodward. Jan 79, 17p HUD-0000798

The content and procedures of the Annual Housing Survey are described to assist people in the use and interpretation of the statistics produced. The Annual Housing Survey, first conducted in 1973, is an important source of statistics on housing characteristics and such related matters as the adequacy of public services, neighborhood quality, and house financing. The survey includes two separate data collection efforts in which the same questions are asked. One is a national survey of a sample of housing units. The second is a yearly survey of a sample of housing units in approximately 20 standard metropolitan statistical areas (SMSA's), a total of 60 selected SMSA's are surveyed every 3 or 4 years. Major results of the national sample survey are published each year in six major reports: (1) 'General Housing Characteristics,' whose statistics update much of the 1970 Census of Population and Housing; (2) 'Indicators of Housing and Neighborhood Quality,' containing much of the data unique to the Annual Housing Survey; (3) 'Financial Characteristics of the Housing Inventory,' which present cross tabulations of various housing and demographic characteristics by income of families and primary individuals, value of owner - occupied units, and gross rent of renter - occupied units; (4) 'Housing Characteristics of Recent Movers'; (5) 'Urban and Rural Housing Characteristics'; and (6) 'Financial Characteristics by Indicators of Housing ad Neighborhood Quality,' which cross classifies housing quality items by value, rent, and income categories. Results from the SMSA samples follow a similar publication format, except that individual reports are issued for each. Unpublished tabulations are also described. The appendices list subjects in the published reports and the microdata files, along with the geography identified in the microdata files.

PB80-172364 PC **A03**/MF **A01**
Anchorage Urban Observatory, AK.
Public Support for Local Government Bonding in Anchorage.
Final rept.,
Richard L. Ender. Dec 77, 27p HUD-0000800

In 1977, the Anchorage Urban Observatory (Alaska) conducted two citizen opinion surveys which found that people generally favored bond issues to finance capital expenditures but were quite selective about issues they would support. Those most likely to favor local government bonding were involved in civic affairs, indicating that the larger the voter turnout the less likely the bond issue will pass, since knowledgeable people would constitute a smaller proportion of the voting population. About 90 percent of the citizens favored bond issues for road construction, 74 percent for a sewage treatment plant, and 68 percent for sewer line extensions. Opposition rose for a civic center (21 percent opposed), a regional library (21 percent opposed) and downtown parking garages (33 percent opposed). Although the police services extension bond issue succeeded due to its accurate presentation and popular support, the library bond issue failed because most Anchorage adults do not use the library, the exact location of the new library was not explained, and little publicity was mounted to gain support. Before putting an issue on the ballot, the city government should try to determine public opinion on the issue and should plan a strong educational campaign. The study contains references and tables.

PB80-176712 PC **A02**
Woods Hole Oceanographic Institution, MA.
Pelagic Shark Fishing in Rural Mexico: A Context for Co-operative Action,
James R. McGoodwin. Oct 79, 12p NOAA-80032104
Pub. in Ethnology, v18 n4 p325-336 Oct 79.

The report examines industrial sociology in the Pelagic shark fishing industry of rural Mexico. Cooperative action among fisherman during shark fishing was found to reduce the objective risks and subjectively perceived uncertainties surrounding various calamities which can arise from that activity.

PB80-177884 PC **A11**/MF **A01**
Northeastern Forest Experiment Station, Broomall, PA.
Proceedings National Outdoor Recreation Trends Symposium (1980) Held at Durham, New Hampshire on April 20-23, 1980. Volume I.
General technical rept. (Final).
1980, 243p NEFES/80-65, FSGTR-NE-57

Proceedings (in two volumes) of a national symposium on recreation trends held at Durham, N.H. on April 20-23, 1980. Volume 1 contains papers on trends in selected recreation activities and in recreation planning, policy, financing, equipment, organizational membership, lands and waters.

PB80-928002 PC **E03**/MF **A01**
Central Intelligence Agency, Washington, DC.
International Terrorism in 1979.
Research paper.
Apr 80, 30p PA-80-10072U
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Most patterns of international terrorist behavior recorded in 1978 continued into 1979: attacks on diplomatic and business facilities, simplicity in operations, and a preference for targets in industrialized democracies. The number of attacks declined worldwide, however, as did the number and proportion of attacks against US citizens. Several terrorist groups stepped up their operations, however, to publicize their respective causes. Intergovernmental cooperation in combating terrorism was spearheaded by a West European agreement on extradition and prosecution and by the passage of a UN convention against the taking of hostages.

6. BIOLOGICAL AND MEDICAL SCIENCES

6A. Biochemistry

AD-A082 724/6 Not available NTIS
Institute for Marine Environmental Research Plymouth (England)
Some Kinetic and Regulatory Properties of the Cytoplasmic L-Malate Dehydrogenases from the Posterior Adductor Muscle and Mantle Tissues of the Common Mussel Mytilus edulis,
David R. Livingstone. 1976, 6p
Availability: Pub. in Meeting (562nd), v4 p447-451 1976 (No copies furnished by DTIC).

No abstract available.

LA-tr-79-36 PC **A02**/MF **A01**
Centre National de la Recherche Scientifique, Orleans-la-Source (France).
Analysis of Carbon-13 Nuclear Magnetic Resonance of Some Enriched Amino Acids and Related Peptides.
E. Bengsch, and M. Ptak. Jul 79, 13p
Contract W-7405-ENG-36
C STI/PUB--442, pp 197-206.

In view of the importance of exp 13 C magnetic resonance in the study of the configurations and chemical properties of peptides and proteins in solution, isotopically enriched amino acids and peptides have been studied. The main characteristics of the nuclear magnetic resonance (NMR) spectra are presented. The enriched amino acids were obtained by biosynthesis and therefore were uniformly enriched (60%). Some also were labeled with exp 15 N. The following were studied in particular: L-serine, L-threonine, L-aspartic acid, L-glutamic acid, cyclo (L-thr-L-thr),cyclo (L-thr-L-his) and cyclo (D-thr-L-his)dissolved in D sub 2 O. Fourier transform spectroscopy was used, so that good spectral resolutions were obtained within a reasonable time. However, multiple couplings and nuclear isomers lead to complex and strongly coupled spectra, which were interpreted with the help of the ITR CAL Program. The values of the enrichment rates, chemical shifts, coupling constants, and isotopic shifts are given. The isotopic shifts of the exp 13 C signal for adjacent substitution are on the average + 0.25 ppM for exp 1 H implies exp 2 H, + 0.010 ppM for exp 12 C implies exp 13 C and + 0.020 ppM for exp 14 N implies exp 15 N; on the other hand, there is no shift of the C' nucleus signal for the substitution exp 12 C implies exp 13 C. From exp 13 C - exp 13 C couplings one can derive information about the charge distribution. In the case of cyclo (L-thr-L-his), the vicinal coupling constants appear to indicate a preferential configuration in solution. On the basis of these results it will be possible to make a thorough study of natu-

ral amino acids and their derivatives. The methods developed in this work will be used in studying peptides of biological interest and selectively enriched proteins. (ERA citation 05:009292)

LBL-10096 PC **A08**/MF **A01**
California Univ., Berkeley. Lawrence Berkeley Lab.
Interaction of Benzo(A)Pyrene-7,8-Dihydrodiol-9,10-Oxide with Simian Virus 40 DNA and Chromatin.
H. B. Gamper, Jr. Nov 79, 174p
Contract W-7405-ENG-48
Thesis.

In mammalian cells, benzo(a)pyrene undergoes metabolic activation to the ultimate carcinogen benzo(a)pyrene-7,8-dihydrodiol-9,10-oxide (BaP diol epoxide). The conformation of simian virus 40 (SV40) DNA and chromatin reacted in vitro with BaP diol epoxide was studied. Nicking of superhelical SV40 DNA was monitored. Approximately 1% of the initial BaP diol epoxide alkylation sites rearranged with strand scission at pH 8.0. This strand scission was due to one or more minor alkylation products. The kinetics of nicking were characteristic of a multistep rearrangement terminating in strand scission. No evidence was obtained for nicking proceeding through a phosphotriester mechanism. The superhelical density of BaP diol epoxide modified superhelical and partially relaxed SV40 DNA was determined and an unwinding angle for the hydrocarbon guanine adduct was calculated. The anlge was dependent upon the torsional strain of the molecule. This data indicated that the modified G-C base pair was disrupted. In the absence of such strain the alkylation sites had an ordered structure with the hydrocarbon oriented in the minor or major groove of the helix. Although BaP diol epoxide adducts were externally bound, the hydrocarbon appeared to intercalate prior to reaction with the exocyclic amino group of guanine. Thus, covalent binding was modulated by helix stability. Counterions inhibited alkylation by up to 90%, Mg exp 2+ being more effective than Na exp +, and superhelical SV40 DNA more susceptible than partially relaxed viral DNA. The alkylation of SV40 minichromosomes was also investigated. Relative to protein-free SV40 DNA, minichromosomal DNA was 1.5X less susceptible to alkylation but 2X more prone to strand scission. The alkylation of minichromosomal DNA was random. (ERA citation 05:012640)

LBL-10119 PC **A09**/MF **A01**
California Univ., Berkeley. Lawrence Berkeley Lab.
Studies of Chromatin in Situ by Fluorescence Correlation Spectroscopy.
S. M. Sorscher. Nov 79, 195p
Contract W-7405-ENG-48
Thesis.

All systems in thermodynamic equilibrium are subject to spontaneous fluctuations from equilibrium. For very small systems, the fluctuations become apparent, and can be used to study the behavior of the system without introducing any external perturbations. The fluorescent dye Ethidium Bromide is especially useful as a probe of DNA because the changes in the fluorescence properties of the dye upon binding to DNA greatly enhance the effect of spontaneous fluctuations in the binding equilibrium. This sensitivity makes small regions of individual cell nuclei appropriate objects for study. All the measurements described employ a laser beam focussed to dimensions of the order of one micron. Knowledge of the beam radius is critical, and a new method for its determination in situ is reported. Experiments are described employing well characterized DNA preparations, including calf thymus DNA, SV-40 DNA, and calf thymus nucleohistone particles. Measurements made in small regions of isolated cell nuclei and on nuclei in vivo are described. These data indicate that the strength of dye binding increases in nuclei when the cells have been stimulated to enter the cell growth cycle. It is also shown that the viscosity decreases as the cells leave the resting state, and enter the cell growth cycle. These experiments demonstrate that fluorescence correlation spectroscopy can provide information at the subnuclear level that is otherwise unavailable. (ERA citation 05:012553)

LBL-9746 PC **A06**/MF **A01**
California Univ., Berkeley. Lawrence Berkeley Lab.
Electron Paramagnetic Resonance Saturation Studies of P700 exp + Reaction Center Chlorophyll in Plant Photosynthesis.
K. A. Rose. Nov 79, 113p
Contract W-7405-ENG-48
Thesis.

Electron paramagnetic resonance (EPR) power saturation and saturation recovery methods have been used to determine the spin-lattice, T sub 1 and spin-spin, T sub 2 , relaxation times of P700 exp + chlorophyll in photosystem I reaction centers of plant chloroplasts as a function of temperature. T sub 1 varied between 9 x 10 exp -4 seconds at 10 exp 0 K and 2 x 10 exp -4 seconds at 80 exp 0 K. T sub 2 varied between 1.2 x 10 exp -7 seconds at 7 exp 0 K and 4 x 10 exp -8 seconds at 40 exp 0 K, corresponding to spin packet linewidths of 0.05 and 0.15 mT respectively. Incubation of D144 fragments with 10 mM ascorbate did not affect P700 exp + spin-lattice relaxation. Ferricyanide was used to poise broken chloroplasts at a redox potential of 460 mV. Upon illumination at 40 exp 0 K these samples exhibited a free radical signal which had a spin-lattice relaxation time of 8 x 10 exp -5 seconds. The short relaxation time is caused by the presence of the ferricyanide. The spin-spin interaction between P700 exp + and both iron sulfur center A and plastocyanin was also examined. Neither reduced center A nor oxidized plastocyanin exhibited any effect on P700 exp + relaxation times. It was calculated that the minimum separation distance for the P700-center A pair and separation for the P700-plastocyanin pair is greater than or equal to 30 A. A nonsaturating power level for the P700 exp + signal at 25 exp 0 K was determined by plotting a power saturation curve. A ratio of 4.8 +- 0.4 was achieved. This indicates that a spin state above the spin = 1/2 state of center A may be significantly populated at low temperature. If so, the entire EPR signal of center A may not be observable under the present conditions and the P700 to center A ration may be lower than measured here. Considering all of the above, the earlier model of a direct 1:1 relationship between P700 and center A can no longer be supported. A more satisfying model would include electron carriers A sub 1 , A sub 2 , and center B. (ERA citation 05:012552)

LBL-9978 PC **A03**/MF **A01**
California Univ., Berkeley. Lawrence Berkeley Lab.
Relation Between Surface Charge Changes in Purple Membranes and the Photoreaction Cycle in Bacteriorhodopsin (Halobacteria, Bioenergetics, Surface Potentials).
C. Carmeli, A. T. Quintanilha, and L. Packer. Oct 79, 29p
Contract W-7405-ENG-48

The surface potential of purple membrane fragments, determined from the distribution of the aqueous-free and the membrane-bound positively charged, paramagnetic, amphiphilic probe 4-(dodecyl dimethyl ammonium)1-oxyl-2, 2,6,6-tetramethyl piperidine bromide, varied almost 60 mV as a function of ionic strength and 50 mV as a function of pH of the medium. Light induced changes in surface potential followed the changes observed in the M sub 412 intermediate of the photocycle of bacteriorhodopsin as a function of pH, temperature, and response to antibiotics Beauvericin and Valinomycin. The number of induced charges per M sub 412 appearing at the surface of purple membranes decreases from 0.75 to 0.6 as the surface potential becomes more negative. The stoichiometric values would be twice as large if the charge changes were localized exclusively on one side of the purple membrane. Laser flash induced kinetics of the rise and decay of surface charge changes lagged behind the kinetics of the rise and decay of M sub 412 which is associated with the reversible deprotonation of the retinal Schiff base nitrogen in the chromophore. It is suggested that the light induced charge changes monitor a dissociable amino acid residue which may be a step in the movement of protons across the purple membrane. (ERA citation 05:014255)

UR-3490/LCP-15 PC **A11**/MF **A01**
Rochester Univ., NY. Dept. of Radiation Biology and Biophysics.
Interaction Between the Catalytic and Ion Transport Sites of the Adenosine Triphosphatase of Sarcoplasmic Reticulum.
T. L. Scott. 1979, 247p
Contract EY-76-C-02-3490
Thesis.

The goal of this thesis is the elucidation of the mechanism of energy transduction between the ATP catalytic site and the ion transport sites of the Ca exp 2+ -Mg exp 2+ ATPase of skeletal muscle sarcoplasmic reticulum (SR). Modification of the ATPase peptide by thiol group blockage with mercurial reagents and proteolytic fragmentation with trypsin is used to perturb the interactions between the hydrolytic and transport processes. (ERA citation 05:012563)

UR-3490-1689 PC **A07**/MF **A01**
Rochester Univ., NY. Dept. of Radiation Biology and Biophysics.
I. Use of M- and p-Azidobenzamidines, 4-Fluoro-3-Nitro-Phenylazide, and 3-Azido-1,2,4-Triazole as Photoaffinity Probes of Tryptic Binding Site Conformation. II. Analysis of Tryptophan in Proteins by an Acidic Reaction of 3-Diazonium-1,2,4-Triazole.
M. C. DeTraglia. 1979, 142p
Contract EY-76-C-02-3490
Thesis.

Meta- and para-azidobenzamidine have been prepared and evaluated as photoaffinity labels. The compounds inhibit trypsin reversibly in the dark and are competitive with substrate binding. Upon photolysis, irreversible noncompetitive inhibition is observed and is dependent upon concentration, photolysis time, and pH. Specificity of the probes is indicated by experiments in which p-tosyl-L-arginine methyl ester, a trypsin substrate, is used to protect against photoinactivation. (ERA citation 05:012562)

UR-3490-1692 PC **A07**/MF **A01**
Rochester Univ., NY. Dept. of Radiation Biology and Biophysics.
Molecular Mechanism by Which Cyclic amp Regulates Myocardial Contractility.
J. M. Bidlack. 1979, 142p
Contract EY-76-C-02-3490
Thesis.

From these experiments, it appears that the phosphorylated 22,000 dalton protein does not regulate the transport properties of the ATPase. Instead phosphorylation of the 22,000 dalton protein causes it to become buried in the membrane, transporting Ca exp 2+ into the sarcoplasmic reticulum and thereby, elevating the Ca exp 2+ concentration in the sarcoplasmic reticulum available for release to the myofibrils. (ERA citation 05:012556)

6B. Bioengineering

PATENT-4 198 990 Not available NTIS
Department of the Air Force Washington DC
Mouth Mounted Accelerometer Pack.
Patent,
Aubin M. Higgins, James A. Fowler, Jr., Roger W. Mercer, and Gunter H. Kroh. Filed 5 Mar 79, patented 22 Apr 80, 8p AD-D007 157/1, PAT-APPL-6-017 624
Supersedes PAT-APPL-6-017 624, AD-D006 046.
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

An apparatus, for measuring head accelerations of a test subject, having a mouthpiece which includes metal clips for securing the mouthpiece to the upper teeth of the test subject. Three accelerometers are secured to a mounting block which is attached to the mouthpiece. The three accelerometers have their active axis located along three orthogonal axis through the mounting block. The mounting block, the accelerometers and the accelerometer leads are embedded in an electrically insulating material. (Author)

PB80-168859 PC **A04**/MF **A01**
CarboMedics, Inc., San Diego, CA.
Studies of Carbon-Surfaced Polymeric, Metallic and Ceramic Biomaterials.
Annual rept. 1 Apr 78-31 Mar 79,
A. D. Haubold, and H. S. Shim. Dec 79, 71p
Contract N01-HV-4-2928

See also report dated May 78, PB-282 893.

The primary goals of this program have been to determine whether thin carbon films that have physical and chemical properties similar to those of LTI carbon also confer the biochemical properties of LTI carbon to the coated composites, and equally important, to determine if these carbon-surfaced composites possess the necessary engineering properties for use in prosthetic devices. The authors have established that the strain to failure of carbon films on polymeric substrates is on the order of 4 to 5%. Failure of the carbon coating always coincided with the onset of plastic deformation in the substrate. The adhesion of the thin coatings is greater than the bulk strength of the polymer. As a service to other NHLBI contractors, the authors have supplied approximately 400 implant rings during the present reporting period.

PB80-175912 MF **A01**
Harvard Univ., Cambridge, MA. Dept. of Physics.
Bone Calcium Determination In Vivo by Proton Activation Analysis.
Doctoral thesis,
Richard Franklin Eilbert. May 75, 241p NSF/RA/T-75-121
Available microfiche only because of poor quality.

A method is presented for in vivo calcium measurement developed at the 160 MeV cyclotron at Harvard University. Advantages of the technique include direct measurement of calcium in the lumbar vertebrae and restriction of dose to the immediate vertebral region. The technique may be used in plotting serial changes of a patient's calcium level in response to treatment. Proton activation of 40Ca(97% abundant) in bone produces 38K which undergoes beta decay, emitting a 2.17 MeV gamma ray with a half life of 7.71 minutes. Knowledge of the proton flux and efficient detection of the subsequent gamma radiation allows a precise determination of calcium in vivo. Precision is mainly limited by counting statistics; a two rad dose over three or four vertebrae ensures measurement reproducibility to within 4%. The report describes certain major problems that were encountered and attempts made to eliminate them. Also presented are studies with phantoms to establish the technique's sensitivity, reproducibility and linearity of response in calcium content and in integral dose. Appendices include computer programs for decay curve analysis and for designing the range modulator.

PB80-176761 PC **A02**
Woods Hole Oceanographic Institution, MA. Dept. of Biology.
Sex Differences in Cytochrome P-450 and Mixed-Function Oxygenase Activity in Gonadally Mature Trout,
John J. Stegeman, and Mordechai Chevion.
c1980, 7p NOAA-80031205
Grants NOAA-04-6-158-44106, NSF-OCE76-84415
Pub. in Biochemical Pharmacology, v29 p553-558 1980. Sponsored in part by Grant NSF-OCE77-24517. Prepared in cooperation with Hebrew Univ., Jerusalem (Israel). Dept. of Cellular Biochemistry.

Levels of microsomal cytochrome P-450 and aminopyrine demethylase activity in liver and of cytochrome P-450 in kidney of gonadally mature rainbow and brook trout were markedly greater in males than in females. Similar differences appeared in hepatic microsolam NADH- but not in NADPH-cytochrome c reductase activity or cytochrome b5 content. When normalized to cytochrome P-450 content, benzo(a)pyrene hydroxylase activity in both liver and kidney was greater in females. In liver, there was a pronounced sex difference in the response of this activity to 7,8-benzoflavone, suggesting cytochromes P-450 of different catalytic function. Electron paramagnetic resonance spectra of hepatic microsomal cytochromes P-450 in mature brook trout were not demonstrably different between males and females, and crystal field parameters indicate that axial ligands to the heme are the same in these as in other cytochromes P-450. Mixed function oxygenase activities in liver of gonadally immature brook trout differed from those in mature fish, and there was no sex difference. The appearance of seasonally dependent sex differences suggests that fish may provide interesting models for studying regulation of sex-specific forms of cytochromes P-450.

6C. Biology

AD-A082 589/3 PC **A02/MF A01**
Boston Univ MA School of Medicine
Gravity Sedimentation Analysis of Human Blood Leukocytes,
N. Catsimpoolas, E. M. Skrabut, A. L. Griffith, and C. R. Valeri. 25 Jun 79, 9p
Contracts N00014-79-C-0168, N00014-70-C-0111
Pub. in Jnl. of Biochemical and Biophysical Methods, v2 p147-153 1980. Sponsored in part by contract N00014-76-C-1155.

No abstract available.

AD-A082 592/7 PC **A02/MF A01**
Boston Univ MA School of Medicine
In Vitro Measurement of P50 -- The pH Correction, and Use of Frozen Red Blood Cells as Controls,
Richard C. Dennis, Duane Bechthold, and C. Robert Valeri. 1979, 9p
Contract N00014-79-C-0168
Pub. in Critical Care Medicine, v7 n9 p385-390 Sep 79. Presented at the IL Spring Symposium 1979, Function of Red Blood Cells, 23-25 Apr 79.

No abstract available.

AD-A082 593/5 PC **A02/MF A01**
Boston Univ MA School of Medicine
Biochemical Modification and Freeze-Preservation of Red Blood Cells. A New Method,
C. R. Valeri, D. A. Valeri, R. C. Dennis, J. J. Vecchione, and C. P. Emerson. 1979, 10p
Contract N00014-79-C-0168
Pub. in Critical Care Medicine, v7 n9 p439-447 Sep 79.

No abstract available.

AD-A082 604/0 PC **A02/MF A01**
Boston Univ MA School of Medicine
Liquid and Freeze-Preservation of Dog Red Blood Cells,
Thomas J. Contreras, John R. Lindberg, George B. Lowrie, Linda E. Pivacek, and Robert M. Austin. 30 May 78, 16p
Contract N00014-79-C-0168
Pub. in Transfusion, v19 n3 p279-292 May-Jun 79.

No abstract available.

AD-A082 607/3 PC **A03/MF A01**
California Inst of Tech Pasadena Div of Engineering and Applied Science
Piliotinas and Hollandinas: Distribution and Behaviour of Large Spirochaetes Symbiotic in Termites,
Leleng To, Lynn Margulis, and Anthony T. W. Cheung. Feb 80, 35p Rept no. E-97B-56
Contract N00014-76-C-0157
Pub. in Microbios, v22 p103-133 1978.

No abstract available.

AD-A082 608/1 PC **A02/MF A01**
Boston Univ MA School of Medicine
Cytotaxins Alter the Sedimentation Behavior of Human Granulocytes,
Nicholas Catsimpoolas, Sanford R. Kurtz, E. M. Skrabut, A. L. Griffith, and C. Robert Valeri. 12 Feb 79, 5p
Contract N00014-79-C-0168
Pub. in Science, v205 n4409 p936-937, 31 Aug 79.

No abstract available.

AD-A082 655/2 PC **A02/MF A01**
Naval Blood Research Lab Boston MA
Studies of Human Platelets by 19F and 31P NMR,
J. L. Costa, C. M. Dobson, K. L. Kirk, F. M. Poulsen, and C. R. Valeri. 8 Jan 79, 8p
Pub. in FEBS Letters, v99 n1 p141-146 Mar 79.

No abstract available.

AD-A082 675/0 PC **A02/MF A01**
Boston Univ MA School of Medicine
Factors that Influence the Process of 51 Chromium Labeling of Human Granulocytes Isolated from Blood by Counterflow Centrifugation,
S. R. Kurtz, R. Carciero, and C. R. Valeri. 26 Jun 78, 7p
Contract N00014-79-C-0168
Pub. in Transfusion, v19 n4 p398-403 Jul/Aug 79.

No abstract available.

AD-A082 697/4 Not available NTIS
Defence and Civil Inst of Environmental Medicine Downsview (Ontario)
The Marginal Fiber Mass in the Utricle of the Pigeon,
Eric R. Young, Manning J. Correia, and Jack P. Landolt. 5 Aug 74, 12p Rept no. DCIEM-74-RP-1028
Availability: Pub. in Brain Research, v81 p533-542 1974 (No copies furnished by DTIC).

No abstract available.

BNL-51069 PC **A07/MF A01**
Brookhaven National Lab., Upton, NY.
Biological Consequences of Environmental Changes Related to Coastal Upwelling: A Simulation Study.
S. O. Howe. May 79, 134p
Contract EY-76-C-02-0016

Two simulation models of marine ecosystem dynamics are formulated and applied to field data. The first is a time-dependent model of phytoplankton growth in nutrient-enriched batch cultures where spatial gradients of dependent variables and the effects of higher tropic level processes are not included. Rates of photosynthesis, nutrient uptake, chlorophyll synthesis and cell division for a single phytoplankton functional group are simulated as functions of photosynthetically active solar radiation, dissolved nutrient concentrations and cell quotas of carbon, nitrogen and silica. The second model combines the phytoplankton growth model with a time dependent, two-dimensional model of coastal upwelling off northwest Africa. (ERA citation 05:014236)

DSE-3891-T1 PC **A03/MF A01**
SRI International, Menlo Park, CA.
Production Cost Analysis of Euphorbia Lathyris. Final Report.
D. A. Mendel. Aug 79, 32p
Contract EG-77-X-01-3891

The purpose of this study is to estimate costs of production for Euphorbia lathyris (hereafter referred to as Euphorbia) in commercial-scale quantities. Selection of five US locations for analysis was based on assumed climatic and cultivation requirements. The five areas are: nonirrigated areas (Southeast Kansas and Central Oklahoma, Northeast Louisiana and Central Mississippi, Southern Illinois), and irrigated areas: (San Joaquin Valley and the Imperial Valley, California and Yuma, Arizona). Cost estimates are tailored to reflect each region's requirements and capabilities. Variable costs for inputs such as cultivation, planting, fertilization, pesticide application, and harvesting include material costs, equipment ownership, operating costs, and labor. Fixed costs include land, management, and transportation of the plant material to a conversion facility. Euphorbia crop production costs, on the average, range between $215 per acre in nonirrigated areas to $500 per acre in irrigated areas. Extraction costs for conversion of Euphorbia plant material to oil are estimated at $33.76 per barrel of oil, assuming a plant capacity of 3000 dry ST/D. Estimated Euphorbia crop production costs are competitive with those of corn. Alfalfa production costs per acre are less than those of Euphorbia in the Kansas/Oklahoma and Southern Illinois site, but greater in the irrigated regions. This disparity is accounted for largely by differences in productivity and irrigation requirements. (ERA citation 05:012592)

EDFB/IBP-77/6 PC **A05/MF A01**
Oak Ridge National Lab., TN.
Analysis of Nonlinear Matrix Equations for Fish Population Dynamics.
L. J. Svoboda, and D. L. DeAngelis. Jan 80, 84p
Contract W-7405-ENG-26
Thesis. Submitted by L.J. Svoboda to Univ. of Tennessee, Knoxville.

P.H. Leslie's matrix model, which predicts population size of individual age classes in discrete time intervals, is examined. Leslie's original constant matrix, as well as the more general nonconstant matrix, to which density-dependence (compensation) has been added, are discussed. The properties of the matrix itself and the properties of the modeled population are presented for each type of model. A population is modeled with the probability of survival of the 0/sup th/ age class, p sub 0 , assumed to be density dependent. The stability of this population, i.e., ability to maintain steady-state, is predicted. It is shown that a population modeled with p sub 0 depending only on the population size of age class 0 will always be stable. When p sub 0 depends on the populations of older age classes it is possible for the population to be unstable, depending on the specific functional relationship. (ERA citation 05:012521)

EDFB/IBP-78/2 PC **A06**/MF **A01**
Oak Ridge National Lab., TN.
SEDFAL: A Model of Dispersal of Tree Seeds by Wind.
D. E. Fields, and D. M. Sharpe. Jan 80, 110p
Contract W-7405-ENG-26

SEDFAL, a numerical model of windblown seed dispersal, simulates seed release as a function of humidity and wind speed for each month of the dispersal interval. Seed terminal velocities are parameterized as a 10-bar histogram, and winds are described according to their frequency of occurrence in 10 wind-speed, 16 direction, and 5 vapor pressure deficit classes. The simulated seed dispersal pattern is summarized numerically, and may be displayed in printer plot form or plotted on a graphics device, with or without numerical smoothing, at the user's discretion. (ERA citation 05:012420)

LA-UR-80-331 PC **A03**/MF **A01**
Los Alamos Scientific Lab., NM.
Correlation of the Growth of Chinese Hamster V sub 2 79-171B Multicellular Spheroids with Cytokinetic Parameters.
T. S. Johnson, E. Bain, M. R. Raju, and J. C. Martin. 1979, 26p CONF-791137-2
Contract W-7405-ENG-36
Engineering Foundation conference on automated cytology, Pacific Grove, CA, USA, 25 Nov 1979.

The volumes of Chinese hamster V sub 2 79-171b multicellular spheroids grown in spinner culture were measured and correlated to DNA distribution and cell volume distribution information. Spheroid growth curves were obtained over a 21 day period using both electronic cell volume measurements and microscope micrometer sizing. The spheroids were collected from the aperture tube after electronic sizing, and single cell suspensions were prepared via trypsinization. Saline-washed cells were then stained with mithramycin and analyzed as unfixed orethanol-fixed cells for both cell volume and DNA fluorescence measurements. Spheroid growth was determined to have an initial 8 to 9 day rapid growth phase, and a slow phase from 10 to 21 days. The single cell volume distributions of cells obtained from spheroids were dependent on spheroid volume and the relative proportions of small volume noncycling cells to large volume cycling cells comprising the spheroids were also dependent on spheroid volume. DNA distribution data and dual parameter DNA distribution cell volume contour patterns obtained for single cells dissociated from spheroids were closely related to the measured spheroid volume and revealed that the fraction of small, hypoxic G sub 0 -like cells was greatest in old, large spheroids. (ERA citation 05:014263)

LA-8143-T PC **A10**/MF **A01**
Los Alamos Scientific Lab., NM.
Determination of Morphological Parameters of Biological Cells by Analysis of Scattered-Light Distributions.
D. E. Burger. Nov 79, 214p
Contract W-7405-ENG-36
Thesis.

The extraction of morphological parameters from biological cells by analysis of light-scatter patterns is described. A light-scattering measurement system has been designed and constructed that allows one to visually examine and photographically record biological cells or cell models and measure the light-scatter pattern of an individual cell or cell model. Using a laser or conventional illumination, the imaging system consists of a modified microscope with a 35 mm camera attached to record the cell image or light-scatter pattern. Models of biological cells were fabricated. The dynamic range and angular distributions of light scattered from these models was compared to calculated distributions. Spectrum analysis techniques applied on the light-scatter data give the sought after morphological cell parameters. These results compared favorably to shape parameters of the fabricated cell models confirming the mathematical model procedure. For nucleated biological material, correct nuclear and cell eccentricity as well as the nuclear and cytoplasmic diameters were determined. A method for comparing the flow equivalent of nuclear and cytoplasmic size to the actual dimensions is shown. This light-scattering experiment provides baseline information for automated cytology. In its present application, it involves correlating average size as measured in flow cytology to the actual dimensions determined from this technique. (ERA citation 05:014261)

LA-8196-MS PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
Correlation of Several Variables for Pulmonary Lavage Samples from Normal Syrian Hamsters.
J. S. Wilson, and J. A. Steinkamp. Jan 80, 7p
Contract W-7405-ENG-36

This study was designed to establish normal values for our pulmonary lavage techniques. Cell samples from normal Syrian hamsters were evaluated and correlated with animal weight and lavage volume. The data indicated a relationship between animal weight and cell yield, a variability in cell yield not related to lavage volume or alterations in cell populations, a maintenance of viability throughout the procedure, and the presence of three basic cell populations. Laser analysis demonstrated the capacity of flow cytometrics to measure DNA of heterogeneous rodent pulmonary lavage samples. Characterization of the cell populations by microscopic observation defined the cell types present, their relative numbers, and presented an element of variability of cell populations. Evaluation of normal rodent pulmonary lavage fluids obtained by this technique represents a necessary preliminary exercise in the development of medical applications of flow cytometrics systems. (ERA citation 05:014262)

LBL-10106 PC **A12**/MF **A01**
California Univ., Berkeley. Lawrence Berkeley Lab.
In Situ Electron Microscopy of Cell Monolayers: Application to the Study of the Interactions Between Balb 3T3 Fibroblasts.
Nov 79, 268p
Contract W-7405-ENG-48
Thesis.

The present study was undertaken to determine whether freeze-fracture could be used to detect possible changes in the properties of Balb 3T3 cell membranes resulting from density-dependent inhibition of growth. An in situ technique for freeze-fracture of monolayer cultures was perfected and was found to increase greatly the yield of information available from replicas of cultured cells. To avoid changes in the properties of cultures which might result from variations in the growth conditions used for different experimental techniques, silicon monoxide was evaluated as a substratum for growing cells during all biochemical and morphological experiments. Vacuum-deposited on both culture dishes and specimen carriers, silicon monoxide exhibited excellent optical, chemical, and heat-conducting properties and proved to be a good substrate for growth of a variety of fibroblastic and epithelial cell lines. Existing cytological techniques were therefore modified for use with silicon monoxide. These technical advances allowed examination of the biochemical properties and native morphology of cultured fibroblasts growing under the same conditions. Morphological studies showed that cellular interactions between Balb 3T3 fibroblasts could be divided into four classes: simple overlap, edge-to-edge contacts, interdigitation, and filopodial interactions. Freeze-fracture studies showed that neither the density nor the distribution of intramembranous particles appeared to be changed by cell contact, suggesting that if the membrane properties of cultured fibroblasts change as a result of density-dependent inhibition of growth, the changes may be reflected in an alteration of the mobility rather than the distribution of the IMP. Therefore, initial experiments were carried out using incubation in glycerol solutions as a means of inducing redistribution of the intramembranous particles. (ERA citation 05:014264)

N80-21014/9 PC **A02**/MF **A01**
National Aeronautics and Space Administration, Washington, DC.
On the Cellular Autoimmune Mechanism for Eliminating Erythrocytes Normally and under Extreme Influences.
Y. I. Pukhova, I. A. Terskov, A. Y. Anikina, and A. V. Shashkin. Mar 80, 15p NASA-TM-75735
Contract NASW-3199
Transl. into English from Patol. Fiziol. Eksp. Ter. (USSR), No. 2, Mar. - Apr. 1979 p 16-22. Transl. By Kanner (Leo) Associates, Redwood City, Calif.

The presence of an autoimmune cellular mechanism for destroying erythrocytes on the basis of results of experiments in vivo is demonstrated in the blood and the organs. This mechanism is made up of a population of immunocompetent killer-lymphocytes which originates in the bone marrow and the thymus, and which is manifested in the local hemolysis effect.

PAT-APPL-967 748 PC **A02**/MF **A01**
Department of Energy, Washington, DC.
Method of Freezing Living Cells and Tissues with Improved Subsequent Survival.
Patent Application,
S. M. Senkan, and G. P. Hirsch. Filed 8 Dec 78, 10p
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

This invention relates to an improved method for freezing red blood cells, other living cells, or tissues with improved subsequent survival, wherein constant-volume freezing is utilized that results in significantly improved survival compared with constant-pressure freezing; optimization is atainable through the use of different vessel geometries, cooling baths and warming baths, and sample concentrations. (ERA citation 05:019579)

PB80-167257 PC **A04**/MF **A01**
Environmental Research Lab.-Duluth, MN.
Freshwater Findings, 1976-1978. Research Publications of the Environmental Research Laboratory, Duluth, Minnesota.
Bibliography rept.,
Chris Russom. Jan 80, 68p EPA-600/9-80-007

This bibliography, inclusive from 1976 through 1978 lists all publications authored by personnel of the Environmental Research Laboratory-Duluth. Some of the research findings were to determine how physical and chemical pollution affects aquatic life; to assess the effects of ecosystems on pollutants; to predict effects of pollutants on large lakes through use of models; to measure bioaccumulation of pollutants in aquatic organisms that are consumed by other animals, including man.

PB80-169311 PC **A06**/MF **A01**
Michigan State Univ., East Lansing. Inst. of Water Research.
An Empirical Study of Factors Affecting Blue-Green Versus Nonblue-Green Algal Dominance in Lakes.
Project completion rept. 1 Oct 78-30 Sep 79,
Kenneth H. Reckhow, and Jonathan T. Simpson. Feb 80, 108p W80-04441, OWRT-A-102-MICH(3)
Contract DI-14-34-0001-9024

In many lakes, the use and enjoyment of the water is limited due to the dominance of undesirable blue-green algae. Exploratory data analysis techniques were applied to 90 north temperate lakes included in the EPA National Eutrophication Survey to examine empirical relationships between: (1) the chemical and physical variables that affect algal dominance in lakes; and (2) the dominant algal type. Single variable box plots and bivariate-discriminant plots document the importance of the inorganic nitrogen concentration and hydraulic

detention time in determining blue-green versus nonblue-green algal dominance in eutrophic lakes. The multivariate statistical technique of discriminant analysis was applied to 68 high alkalinity lakes in the data set to: (1) further identify variable relationships; and (2) construct a simple predictive model for algal dominance.

PB80-170418 PC A02
San Diego State Univ., CA. Center for Marine Studies.
The Purple-Hinge Rock Scallop: A New Candidate for Marine Aquaculture,
D. L. Leighton, and C. F. Phleger. c1977, 18p CONTRIB-18, NOAA-80031209
Grant NOAA-04-6-158-44021
Pub. in Proceedings of the Annual Meeting World Mariculture Society (8th) Held at San Jose, Costa Rica, on January 9-13, 1977 p457-469 1977.

Studies on spawning and larval culture in the purple-hinge rock scallop (Hinnites multirugosus) are described together with information on growth of juveniles and adults. Gravid individuals were collected from field populations throughout most of the year. These produced viable eggs when induced to spawn in the laboratory. Larval development appeared normal over the range 8-18C (optimal for culture, 14-18C). Acceptable growth and survival were achieved on a mixed diet. Most rapidly growing post-larvae reached 1.8 mm at two months (15-18C).

PB80-171184 PC A02
Washington Univ., Seattle.
A Comparative Analysis of In situ Methods for Directly Measuring the Acoustic Target Strength of Individual Fish,
John E. Ehrenberg. c1979, 13p WSG-TA-79-16
Pub. in IEEE Jnl. of Oceanic Engineering, vOE-4 n4 p141-152 Oct 79.

In recent years, acoustic techniques have been used extensively to monitor and quantify fish stocks remotely. One of the parameters that is often measured is the target strength of the individual fish in the population. To obtain the target strength of a fish from its acoustic echo, the effect of the transducer beam-pattern factor must be removed from the echo amplitude. This paper discusses a number of different approaches for directly estimating the beam-pattern factor for an individual fish target. The effects of noise and interfering signals on the various estimation techniques are investigated.

PB80-171192 PC A03/MF A01
North Carolina Div. of Marine Fisheries, Morehead City.
Preliminary Stock Assessment, North Carolina: Rock Shrimp 'Sicyonia brevirostris'.
Completion rept. Oct-Dec 79,
David L. Taylor. Mar 80, 26p NOAA-80031006

During October, 1979, the R/V Dan Moore utilized a conventional shrimp trawl at 22 locations offshore North Carolina from south of Cape Hatteras to southwest of Cape Fear in search of rock shrimp (Sicyonia brevirostris). Data were compiled on distribution, relative abundance, size and sex composition, and cull rates.

PB80-171200 PC A02/MF A01
Mississippi State Univ., Mississippi State. Dept. of Wildlife and Fisheries.
Heritabilities and Genetic Correlations of Desirable Commercial Traits in Channel Catfish,
Roland E. Reagan, Jr. Feb 80, 6p NOAA-80031005

Most animal breeders are interested in selecting for several traits, but selecting one trait at a time is inefficient. A more efficient method of improving catfish breeding stock is to select individual males and females with traits this study showed to be heritable, but using an index developed from the heritability estimates weighted with dollar values assigned to the desired traits. Using results of this study for weight at 18 months and length at 90 days gives an index for the Tupelo strain of catfish. The length and weight used in calculating the index represents fingerlings for stocking and food fish.

PB80-173735 PC A04/MF A01
Iowa State Conservation Commission, Des Moines.
Assessment of Change in Commercial Size Limit of Channel Catfish.
Completion rept. Oct 77-Sep 79,
John Pitlo, Jr. Mar 80, 69p NOAA-80031803

Channel catfish harvest and population statistics were described for pools 9, 11, 13, and 18 in the Mississippi River to assess the effectiveness of changing the minimum commercial legal length from 13 inches to 15 inches. The change in minimum length was deemed necessary to prevent over-exploitation and reduce fluctuating harvests. The project was terminated when legislation necessary to increase the minimum length of commercially harvested catfish was not enacted. Channel catfish harvest by Iowa commercial fishermen totaled over 538,000 lbs in 1977 and 623,000 lbs in 1978. Eighty-five percent of the catch was marketed by 24% of the fishermen. Length and weight information was obtained from 5,624 channel catfish, of which 4,443 were commercially harvested and 1,181 were experimentally sampled.

PB80-173750 PC A04/MF A01
Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO.
Biology and Management of Threatened and Endangered Western Trouts.
Forest Service general technical rept. (Final),
R. J. Behnke, and Mark Zarn. Aug 76, 52p FSGTR-RM-28

The report discusses taxonomy, reasons for decline, life history and ecology, and suggestions for preservation and management of six closely related trouts native to western North America: Colorado River cutthroat, Salmo clarki pleuriticus; greenback trout, S. c. stomias; Gila trout, S. gilae; and Arizona native trout, S. apache. Meristic characters, distribution and status, habitat requirements and limiting factors, protective measures, and management recommendations are presented for each taxon.

PB80-174378 MF A01
Living Marine Resources, Inc., San Diego, CA.
Alternative Fishery Statistical Information System for Central and Western Pacific Regions within Management Purview of the United States Western Pacific Regional Fishery Management Council.
Apr 79, 152p NOAA-80031103, NMFS/SWFC/AR-H-79-25C
Contract NOAA-03-7-208-35257
Available Microfiche only because of poor quality.

The object of the report is to develop fishery statistical information systems for collection of catch and effort statistics from both commercial and recreational fisheries in Hawaii, American Samoa, Guam, and the Northern Marianas to meet the management needs of the Western Pacific Regional Fisheries Management Council.

PB80-174642 PC A02
Washington Univ., Seattle. Office of Biology Education.
Factors Involved in Herbivore Food Preference,
M. E. Nicotri. c1980, 15p NOAA-80031204
Grant NOAA-04-6-158-44016
Pub. in Jnl. of Exp. Mar. Biol. Ecol., v42 p13-26 1980. Prepared in cooperation with Woods Hole Oceanographic Institution, MA. Contrib. no. 4154.

Herbivore food preference can be measured either in terms of attractiveness or of edibility; these quantities are not necessarily correlated. The isopod Idotea baltica (Pallas) is attracted to large, tough, branched algae (perennials) while the amphipod Ampithoe valida (Smith) is attracted to softer, filamentous or bladed algae (ephemerals). Attractiveness for Ampithoe is related to the nutritive value of the algae; this is not so for Idotea, which responds more to algal morphology and availability. Idotea's mobility, possible susceptibility to fish predation, and preference for moderate wave exposures may select for a primary response to algae as habitat rather than as food source.

PB80-174691 PC A02/MF A01
Georgia Dept. of Natural Resources, Atlanta. Coastal Resources Div.
Coordination of P. L. 88-309 Program.
Completion rept. Jul 76-Sep 79,
C. Duane Harris. Feb 80, 10p NOAA-80030801

Major accomplishments of Project 20285-S during its three years duration were coordination of field work and submission of annual and completion reports of Projects 2-233-R, 'Assessment of Georgia's Shrimp and Crab Fishery Resources,' and 2-234-R, 'Survey of Georgia's Oyster Resources.' This report presents a summary of each segment of projects.

PB80-176688 PC A02
Woods Hole Oceanographic Institution, MA.
Aquaculture Policies in Latin America,
Francisco J. Palacio. Apr 79, 8p NOAA-80032102
Pub. in Marine Policy, p99-105 Apr 79. Prepared in cooperation with Rosenstiel School of Marine and Atmospheric Science, Miami, FL.

The social dimension of aquaculture is the most important aspect in developing policies aimed at its implementation and optimization in Latin America. On a broad scale, the potential for aquaculture in meeting food needs is limited; its greatest promise lies in providing supplemental proteins to the rural poor. This goal cannot be considered independently from policies leading to regionalization and self-sufficiency. The principal problems in aquaculture development in Latin America lie in the diffusion of policy and responsibilities for implementation. High reliance is placed on international assistance without stimulating the indigenous capabilities and opportunities for its extension.

PB80-176696 PC A02
Woods Hole Oceanographic Institution, MA.
The Human Costs of Development,
James Russell McGoodwin. Feb 80, 9p NOAA-80032101
Pub. in Environment, v22 n1 p25-31 and 42 Feb 80. Prepared in cooperation with Colorado Univ., Boulder.

Anticipating the conclusion of the Third United Nations Conference on the Law of the Sea in 1975, 80 coastal nations extended their jurisdictional claims over ocean economic resources to 200 nautical miles from their shores. Most of these countries are enthusiastically promoting new maritime developments, and in less developed countries (LDCs) the mood seems particularly bullish. Many of these nations-struggling with domestic food shortages and scarce capital for development--look to their fisheries as a source of protein-rich foods, and for substantial income from exports. Moreover, the participation of their own rural poor in fisheries development should, as a matter of policy, be given at least equal importance with the possible income the fisheries can generate.

UCLA-12-1231 PC A03/MF A01
California Univ., Los Angeles. Lab. of Nuclear Medicine and Radiation Biology.
Ultrastructural Differentiation and Synaptogenesis in Aggregating Rotation Cultures of Rat Cerebral Cells.
E. J. Lu, W. J. Brown, R. Cole, and J. de Vellis. 1979, 35p
Contract EY-76-C-03-0012

Cerebral cortices from fetal rats were dissociated into single cells by either trypsinization or mechanical sieving. Then the cells were allowed to form aggregates in rotation cultures. At 7, 14, 21, 28, and 35 days, aggregates were processed for electron microscopic study of morphological differentiation with special emphasis on synaptogenesis. Whether the tissue was initially dissociated by trypsin treatment or by mechanical sieving, the aggregating cultures did not exhibit any apparent differences in ultrastructural differentiation and synaptogenesis. At day 7, most neurons were immature and the extracellular space was large. Cell processes had not yet branched extensively but did contain numerous microtubules. A few immature synapses were observed. Astrocytes and oligodendrocytes displayed many of their typical cytological features. At day 14, dendritic spines had developed, some of which formed axodendritic spinous synapses. Multilayered myelin sheaths were tightly wrapped around axons. At day 21, synapses

appeared mature and their number per unit area was maximal. The extracellular space had greatly decreased. At this age, asymmetrical synapses had increased approximately sixfold, whereas symmetrical synapses increased only fourfold when compared with the 7-day-old aggregates. Multifocal degeneration became apparent at 28 days and was accompanied by a significant decline in the number of synapses. (ERA citation 05:014266)

UCLA-12-1233 PC **A04**/MF **A01**
California Univ., Los Angeles. Lab. of Nuclear Medicine and Radiation Biology.
Glial-Released Proteins in Clonal Cultures and Their Modulation by Hydrocortisone.
A. T. Arenander, and J. de Vellis. 1979, 53p
Contract EY-76-C-03-0012

Rat glial C6 cells release into the culture medium a reproducible spectrum of soluble proteins of 12 major peaks over a broad molecular weight range as determined by fractionation on SDS-gel electrophoresis. Exposing C6 monolayers to hydrocortisone (HC) results in a selective alteration in the pattern of glial-released protein (GRP). The selective HC-induced increase or decrease in GRP peaks is specific to HC in that 17 beta -estradiol, dibutyryl cyclic AMP, isoproterenol, and melatonin exert either no detectable or a qualitatively different influence on the GRP pattern. The HC influence is dose dependent over a physiological range of concentrations from 10 exp -9 to 10 exp -6 M. Differences in culture age and in subclones of C6 can influence both the normal and the HC-induced pattern of GRP. The origin of the GRP is unknown, but pattern reproducibility, viability tests, surface labelling studies, and metabolic labelling studies of soluble and particulate compartment proteins and glycoproteins support the position that cell lysis is not an important source of GRP. More importantly, these studies indicate that GRP and HC-induced changes in GRP pattern are physiologically significant aspects of glial cell behavior. (ERA citation 05:014267)

UCRL-83854 PC **A03**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Methods for Human and Murine Sperm Assays.
A. J. Wyrobek. Jan 80, 33p CONF-800113-1
Contract W-7405-ENG-48
Workshop on short term tests for chemical carcinogens, Vancouver, BC, Canada, Jan 1980.

Human sperm assays in the context of an epidemiological study provide an effective means to identify agents that affect testicular function. Four assays for human sperm anomaly (counts, motility, morphology, and double-fluorescence bodies) have been successfully used for a variety of human occupational and drug-related exposures. However, more research is needed to validate the genetic implications of sperm defects induced by exposure to chemicals in vivo. The F sub 0 and F sub 1 mouse-sperm assay, especially for induced morphological defects, provides a method of screening agents that may be potentially harmful to man and provides a means to assess the antifertility effects and consequences of induced sperm defect. (ERA citation 05:014268)

UR-3490-1787 PC **A10**/MF **A01**
Rochester Univ., NY. Dept. of Radiation Biology and Biophysics.
Modification of Sodium and Potassium Channel Kinetics by Diethyl Ether and Studies on Sodium Channel Inactivation in the Crayfish Giant Axon Membrane.
B. P. Bean. 1979, 214p
Contract EY-76-C-02-3490
Thesis.

The effects of ether and halothane on membrane currents in the voltage clamped crayfish giant axon membrane were investigated. Concentrations of ether up to 300 mM and of halothane up to 32 mM had no effect on resting potential or leakage conductance. Ether and halothane reduced the size of sodium currents without changing the voltage dependence of the peak currents or their reversal potential. Ether and halothane also produced a reversible, dose-dependent speeding of sodium current decay at all membrane potentials. Ether reduced the time constants for inactivation, and also shifted the midpoint of the steady-state inactivation curve in the hyperpolarizing direction. Potassium currents were smaller with ether present, with no change in the voltage dependence of steady-state currents. The activation of potassium channels was faster with ether present. There was no apparent change in the capacitance of the crayfish giant axon membrane with ether concentrations of up to 100 mM. Experiments on sodium channel inactivation kinetics were performed using 4-aminopyridine to block potassium currents. Sodium currents decayed with a time course generally fit well by a single exponential. The time constant of decay was a steep function of voltage, especially in the negative resistance region of the peak current vs voltage relation.The time course of inactivation was very similar to that of the decay of the current at the same potential. The measurement of steady-state inactivation curves with different test pulses showed no shifts along the voltage asix. The voltage-dependence of the integral of sodium conductance was measured to test models of sodium channel inactivation in which channels must open before inactivating; the results appear inconsistent with some of the simplest cases of such models. (ERA citation 05:014291)

UR-3490-1790 PC **A07**/MF **A01**
Rochester Univ., NY. Dept. of Radiation Biology and Biophysics.
Studies of DNA Repair in Saccharomyces Cerevisiae. I. Characterization of a New Allele of RAD6. II. Investigation of Events in the First Cell Cycle after DNA Damage.
J. A. Douthwright-Fasse. 1979, 136p
Contract EY-76-C-02-3490
Thesis.

Studies in two independent, but related, areas of DNA repair have been carried out in Saccharomyces cerevisiae; characterization of a new allele in the RAD6 gene which suggests that the gene is multifunctional, and utilization of photoreactivation as a probe of events occurring during the first cell cycle after DNA damage. Strains carrying the new allele, designated rad6-4, are as sensitive to uv and ionizing radiation as those carrying rad6-1 or rad6-3 but, unlike them, are capable of induced mutagenesis and sporulation. Although rad6-4 may well be a missense mutation, the evidence shows that it is unlikely that this phenotype is due to leakiness. Instead, the data suggest that the RAD6 gene is multifunctional. One function is necessary to recover from DNA damage in an error-free manner, and the other is concerned with mutagenic processes and sporulation. Rad6-1 and rad6-3 strains are deficient in both of these functions, while rad6-4 strains are deficient only in the error-free function. The loss of photoreversibility (LOP) of ultraviolet induced mutations to arginine independence in an excision defective strain carrying arg4-17 examines the events occurring in the first cell cycle after DNA damage. LOP is dependent upon de novo protein synthesis. LOP begins immediately after UV irradiation, before semiconservative DNA synthesis takes place, and is complete after four hours in growth medium.There is no evidence indicating whether the normal function of the protein is involved in excision repair, or in one of the two repair processes believed to be inducible; induced mutagenesis or recombinational repair. (ERA citation 05:014270)

6E. Clinical Medicine

AD-A082 491/2 PC **A05**/MF **A01**
RAND Corp Santa Monica CA
Quality of Care Provided by Physician's Extenders in Air Force Primary Medicine Clinics.
Interim rept.,
George A. Goldberg, and David G. Jolly. Jan 80, 86p Rept no. RAND/R-2436-AF
Contract F49620-77-C-0023
Includes errata sheet dated 10 Mar 80.

Evaluates the quality of care of physician's extenders (23 physician's assistants and 7 primary care nurse practitioners) in Air Force primary medicine clinics, as part of an evaluation of PEs assuming care formerly provided by physicians. Physician's assistants performed at least as well as MDs on 25 out of 28 nonredundant process-of-care criteria. Nurse practitioners met the MD standard on 14 of 19 criteria. No major differences were found in PEs' use of ancillary services (laboratory and x-ray) or orders for further care when controlling for case-mix. As expected, PEs consulted MDs infrequently, but more often for serious complaints and at rates similar to those found in other PE studies. The study concludes that the Air Force can deliver the same quality of care when PEs treat a sizeable proportion of patients formerly treated by MDs. (Author)

AD-A082 516/6 PC **A14**/MF **A01**
Brooke Army Medical Center Fort Sam Houston TX
Annual Research Progress Report, Fiscal Year 1979,
Charles T. Thornsvard. 1 Oct 79, 313p
See also report dated 1 Oct 78, AD-A070 281.

Subject report identifies the research activities conducted by Brooke Army Medical Center investigators through protocols approved by the Clinical Investigation Committee and the Human Use Committee for registrations with the Clinical Investigation Service during Fiscal Year 1979 and other known presentations and publications by the Brooke Army Medical Center professional staff. A resume of each protocol giving the objectives, technical approach and progress is presented. (Author)

AD-A082 587/7 PC **A02**/MF **A01**
Armed Forces Radiobiology Research Inst Bethesda MD
Cardiac Arrhythmias Accompanying Acute Compression of the Spinal Cord,
Delbert E. Evans, Arthur I. Kobrine, and Hugo V. Rizzoli. 1980, 10p
Pub. in Jnl. of Neurosurgery, v52 p52-59 1980.

No abstract available.

AD-A082 591/9 PC **A02**/MF **A01**
Boston Univ MA School of Medicine
Importance of Oxygen Transport in Clinical Medicine,
Herbert B. Hechtman, Gene A. Grindlinger, Armando M. Vegas, Jonah Manny, and C. Robert Valeri. 1979, 8p
Contracts N00014-79-C-0168, DAMD17-78-C-8026
Pub. in Critical Care Medicine, v7 n9 p419-423 Sep 79. Presented at the IL Spring Symposium 1979, Function of Red Blood Cells, held 23-25 Apr 79.

No abstract available.

AD-A082 647/9 PC **A02**/MF **A01**
Walter Reed Army Inst of Research Washington DC
Lack of Specific Effect of Adenine Arabinoside, Human Interferon and Ribavirin on In vitro Production of Hepatitis B Surface Antigen,
Stanley M. Lemon, and William H. Bancroft. 21 Mar 79, 5p
Pub. in the Jnl. of Infectious Diseases, v140 n5 p798-801 Nov 79.

No abstract available.

AD-A082 650/3 PC **A02**/MF **A01**
Naval Dental Research Inst Great Lakes IL
Effects of Dextranases on Attachment of Streptococcus mutans to Hydroxyapatite,
L. G. Simonson, and D. Jackola. 10 Apr 79, 8p
Rept no. NDRI-PR-79-05
Pub. in Antimicrobial Agents and Chemotherapy, v16 n1 p9-12 Jul 79.

No abstract available.

AD-A082 656/0 PC **A02**/MF **A01**
Boston Univ MA School of Medicine
Therapeutic Transfusions of Previously Frozen Washed Human Platelets,
Charles G. Zaroulis, Jesse I. Spector, C. P. Emerson, and C. Robert Valeri. 12 Jun 78, 10p
Contracts N00014-79-C-0168, N00014-70-C-0111
Pub. in Transfusion, v19 n4 p371-378 Jul-Aug 79.

No abstract available.

AD-A082 676/8 PC **A02**/MF **A01**
Boston Univ MA School of Medicine

Lactic Acidemia in Baboons after Transfusion of Red Blood Cells with Improved Oxygen Transport Function and Exposure to Severe Arterial Hypoxemia,
C. G. Zaroulis, L. E. Pivacek, G. B. Lowrie, and C. R. Valeri. 12 Jun 78, 7p
Contract N00014-79-C-0168
Pub. in Transfusion, v19 n4 p420-425 Jul/Aug 79.

No abstract available.

AD-A082 741/0 PC **A03**/MF **A01**
RAND Corp Santa Monica CA
Potential Civilian Earnings of Military Physician's Assistants.
Interim rept.,
Susan Hosek. Feb 80, 41p Rept no. RAND/N-1342-AF
Contract F49620-77-C-0023

This paper discusses the adequacy of military physician's assistants' (PAs') pay under two grade options: warrant officer and commissioned officer. Military career pay profiles are compared with estimated civilian experience-earnings profiles. These estimated civilian earnings profiles are estimated from 1978 earnings data collected by the Association of Physician Assistant Programs. Because military PAs are relatively well qualified, the earnings estimates are based on a sample of comparably qualified civilian PAs. Comparisons of military and potential civilian earnings profiles under the two grade options and assuming varying amounts of pre-PA military service fail to provide conclusive support for either commissioning or warrant officer status. However, the comparisons do suggest that, if the military wishes to follow the Air Force's lead and intensively employ PAs, commissioning may be needed to guarantee an adequate supply of qualified PAs. (Author)

AD-A082 841/8 PC **A02**/MF **A01**
Army Medical Research Inst of Infectious Diseases Frederick MD
Endogenous Pyrogen Physiology.
Interim rept.,
William R. Beisel. 10 Dec 79, 25p

When appropriately activated, mobile and fixed phagocytic cells can produce and release endogenous pyrogen and/or a variety of endogenous mediating substances into surrounding body fluids. The EP/LEM substances have hormone-like stimulatory effects upon distant body tissues. Although their molecular composition and nature of action at the cellular level remain undefined, these endogenous mediating substances appear to initiate or modulate fever as well as many of the generalized host metabolic and physiologic responses that accompany an infectious or inflammatory disease. (Author)

AD-A082 842/6 PC **A03**/MF **A01**
Army Medical Research Inst of Infectious Diseases Frederick MD
Infectious Diseases,
William R. Beisel. 29 Feb 80, 50p

Approaches to the nutritional management of infectious disease problems can be summarized in a series of guidelines and therapeutic steps in most clinical situations. Body defensive mechanisms that prevent or minimize infectious illnesses seem to function best when a patient is in normal nutritional balance. Deficits or excesses of nutrients may predispose to an increased risk of infection or to an infection of increased severity. Although nutritional management during the therapy of most infections falls into the realm of secondary or supportive care, on rare occasions immediate correction of a nutritional abnormality may be of life-saving importance. It should then take precedence in the management of the illness. These emergency situations generally involve the correction of severe fluid and electrolyte or acid-base abnormalities. Severe hypoglycemia or anoxia must also be corrected without delay. (Author)

AD-A082 877/2 PC **A02**/MF **A01**
Walter Reed Army Inst of Research Washington DC
Plasmid Associated with Pathogenicity and Calcium Dependency of Yersinia enterocolitica,
P. Gemski, W. J. Laird, Janet R. Lazere, and T. Casey. 1979, 5p
Pub. in Infection and Immunity, v27 n2 p682-685 Feb 80.

No abstract available.

AD-A082 887/1 PC **A02**/MF **A01**
Biomedical Research Inst Rockville MD
Penetration Enzymes of Schistosome Cercariae.
Annual rept. no. 4,
M. A. Stirewalt, and F. A. Lewis. 31 Dec 79, 24p
Contract N00014-76-C-0053

The infective process during which schistosome cercariae invade the skin of vertebrate hosts includes several aspects about which our knowledge is incomplete. These aspects concern changes in the relationship of the cercariae to the snail host in which they developed, in penetrated vertebrate host skin, and in the invading parasite itself. In order better to understand the infective process, data have been accumulated and analyzed under the following headings: (1) the infective process - fluctuations in snail-cercaria relations; (2) the infective process - the rotifer problem; (3) morphological (fine structural) changes as cercariae transform to schistosomules; and (4) antigenicity of secreted cercarial preacetabular enzyme.

AD-A082 894/7 Not available NTIS
Undersea Medical Society Inc Bethesda MD
Underwater Medicine and Related Sciences. A Guide to the Literature. Volume 4,
Margaret F. Werts, and Charles W. Shilling. 1979, 698p
Contract N00014-79-C-0435
See also Volume 3, AD-A047 904.
Availability: Undersea Medical Society, Inc., 9650 Rockville Pike, Bethesda, MD 20014 HC $35.00 (No copies furnished by DTIC).

This volume is the fifth annotated bibliography on underwater medicine to be compiled by these authors. The first, entitled AN ANNOTATED BIBLIOGRAPHY ON DIVING AND SUBMARINE MEDICINE, was published by Gordon and Breach Science Publishers in 1971, and covered material published during the mid and late sixties. The second, entitled UNDERWATER MEDICINE AND RELATED SCIENCES: A GUIDE TO THE LITERATURE, and the third, with the same title, Volume Two, were published by Plenum Publishing Co. in 1973 and 1975 respectively. Volume Four bearing the same title, Volume Three, was published by the Undersea Medical Society. These volumes brought the coverage up through 1975. The present volume consists chiefly of material published during 1976 and 1977. It is the purpose of these volumes to present recent work in the area of underwater research in the form of informative abstracts, along with a permuted subject index and an author index. The microthesaurus upon which the index is based is also presented, with a short note explaining its use and that of the index. These two features should make it possible for the user to search out any specific areas of hyperbaric research, to learn what is being done, where, and by whom, and also to spot gaps that should be filled. The articles, reports, and papers represented by the abstracts are in most cases readily available. With the rapidly growing need for information on the physical and physiological aspects of the underwater environment, this series should prove increasingly useful, both to the research scientist and to the underwater engineer.

AD-A082 900/2 Not available NTIS
Army Medical Research Inst of Infectious Diseases Frederick MD
Evaluation of a Killed Rocky Mountain Spotted Fever Vaccine in Cynomolgus Monkeys,
Janet C. Gonder, Richard H. Kenyon, and Carl E. Pedersen, Jr. 27 Aug 79, 5p
Availability: Pub. in Jnl. of Clinical Microbiology, v10 n5 p719-723 Nov 79 (No copies furnished by DTIC).

No abstract available.

AD-A082 902/8 PC **A02**/MF **A01**
Walter Reed Army Inst of Research Washington DC
Dengue-2 Vaccine: Viremia and Immune Responses in Rhesus Monkeys,
Robert McNair Scott, Ananda Nisalak, Kenneth H. Eckels, Markpol Tingpalapong, and Venton R. Harrison. 1979, 8p
Pub. in Infection and Immunity, v27 n1 p181-186 Jan 80.

No abstract available.

AD-A082 903/6 PC **A02**/MF **A01**
Walter Reed Army Inst of Research Washington DC
Isolation of Dengue Viruses from Peripheral Blood Leukocytes of Patients with Hemorrhagic Fever,
Robert McNair Scott, Ananda Nisalak, Usa Cheamundon, Surapee Sridhranakul, and Suchitra Nimmannitya. 24 May 79, 8p
Pub. in the Jnl. of Infectious Diseases, v141 n1 p1-6 Jan 80.

No abstract available.

AD-A082 904/4 PC **A02**/MF **A01**
Walter Reed Army Inst of Research Washington DC
Dengue-2 Vaccine: Preparation from a Small Plaque Virus Clone,
Kenneth H. Eckels, Venton R. Harrison, Peter L. Summers, and Philip K. Russell. 1979, 7p
Pub. in Infection and Immunity, v27 n1 p175-180 Jan 80.

No abstract available.

AD-A082 933/3 PC **A02**/MF **A01**
Army Medical Research Inst of Infectious Diseases Frederick MD
Intracerebroventricular Injection of Rats: A Sensitive Assay Method for Endogenous Pyrogen (RAT ICV Assay for EP).
Interim rept.,
Walter J. Critz. 12 Dec 79, 18p

Fever in infected mammals has been attributed to the release of endogenous pyrogen (EP) into the bloodstream and its subsequent action upon the hypothalamic region of the brain. EP affects the temperature-regulating neurons, resulting in an alteration of the 'set-point' for body temperature. Endogenous pyrogen is a small (15,000 dalton) heat-labile protein produced upon stimulation of phagocytic cells. Its biological activity is currently detected by two methods: a well-established rabbit bioassay and a newly introduced, sensitive mouse bioassay. The much greater sensitivity observed with the mouse assay compared to the rabbit method is offset by the fact that it is not quantitative except for a narrow range of EP concentrations. This is unfortunate because the more sensitive the assay, the lower the concentration at which the pyrogen can be detected. Furthermore, less material is used per assay, so that precious EP supplies can be conserved. Intracerebroventricular (icv) administration of small volumes of crude rabbit EP has been shown to result in hyperthermia in rats. An attempt was therefore undertaken to quantitate this effect and determine its usefulness for measuring EP. The results reported here indicate that icv injection in rats is a sensitive, quantitative assay method for EP activity with distinct advantages over both mouse and rabbit bioassays. (Author)

AD-A082 962/2 PC **A02**/MF **A01**
Foreign Technology Div Wright-Patterson AFB OH
Aerogenic Dissemination of Aphtae Epizooticae,
Jerzy Wisniewski. 14 Mar 80, 14p Rept no. FTD-ID(RS)T-0112-80
Edited trans. of Medycyna Weterynaryjna (Poland) v34 n7 p407-411 1978, by Ilia Kimmelfeld.

No abstract available.

AD-A082 998/6 PC **A17**/MF **A01**
Army Research Inst of Environmental Medicine Natick MA
Annual Progress Report, Fiscal Year 1978.
Rept. for 1 Oct 77-30 Sep 78.
1 Oct 78, 397p

A report of progress on the research program of the US Army Research Institute of Environmental Medicine for Fiscal Year 1978 is presented.

AD-A083 018/2 PC **A02**/MF **A01**
Army Inst of Dental Research Washington DC
Marginal Leakage of a Softened Temporary Restoration as Determined by Microorganism Penetration.
Rept. for 1979-1980,
David L. Keller, Donald D. Peters, Jean Setterstrom, and W. E. Bernier. 31 Mar 80, 23p

The ability of Proteus vulgaris to penetrate through IRM and gutta percha was investigated by using an in vitro model system consisting of extracted teeth embedded in acrylic. Cavity preparations in the embedded teeth which were sealed with gutta percha allowed penetration within 48 hours of proteus in 100% of the models, whereas, those sealed with IRM allowed penetration in 36% in 48 hours. The model system was valuable in detecting the penetration of bacteria through temporary restorative materials. (Author)

ANL-79-XX-99 PC **A09**/MF **A01**
Argonne National Lab., IL.
New Radionuclide Generator Systems for Use in Nuclear Medicine.
R. W. Atcher. 1979, 179p
Contract W-31-109-ENG-38
Thesis.

A current emphasis in nuclear medicine is to better match the physical lifetime of the radionuclides used in vivo for diagnosis and treatment to the biological lifetime of the diagnostic procedure or to minimize radiation dose to areas other than those to be treated. In many cases the biological lifetime is on the order of minutes. Since the direct production of radionuclides with half lives of minutes requires the user to be near a suitable reactor or accelerator, this study was undertaken to produce short-lived radionuclides indirectly. If a long-lived radionuclide decays into a short-lived radionuclide, quick separation of the daughter activity from the parent enables the user to have a short-lived daughter while freeing him from the constraint of proximity to a cyclotron. Systems where a short-lived daughter is separated from a long-lived parent are called radionuclide generators. Two generator systems were developed for use in nuclear medicine, one in diagnostic work and the other for therapeutic work. The yield and breakthrough characteristics were within the limits required to minimize unnecessary radiation exposure in patients. Two parent radionuclides were produced using exp 4 He beams available from medium energy cyclotrons. The yield was high enough to produce generators that would be useful in clinical applications. (ERA citation 05:010623)

CEA-CONF-4234 PC **A02**/MF **A01**
CEA Centre d'Etudes Nucleaires de Saclay, Gif-sur-Yvette (France). Dept. de Biologie.
Role of Quantitative and Dynamic Radioactive Studies in Renal Testing.
C. Raynaud. 1977, 11p CONF-771083-3
Symposium on training programs in medical physics, Rio de Janeiro, Brazil, 23 Oct 1977.
U.S. Sales Only.

Many dynamic and quantitative radioactive tests are at present used in studying renal function. Whether involving dynamic morphological tests such as sequential images, dynamic quantitative tests such as the renogram or quantitative static tests such as radioactive clearances, their effective and original contribution is rather unimportant. Only one provides original data, the Hg renal uptake test but it is generally avoided due to the radiation dose absorbed by the kidney in children. A study of the causes of this lack of effectiveness leads to the observation that such tests are not well adapted to the needs of kidneys specialists. They are for the most part based on replacing a 'coid' indicator by radioactive indicator and the advantages anticipated from using radionuclide are not evident. In fact, they are often cancelled by the shortcomings of external detection. For the future, it seems indispensable to abandon some traditional concepts which lead us to consider that the only exploitable renal function is represented by excretion. The kidney has other functions; one of the most interesting seems to be the function of uptake of heavy metals and toxic substances, a study of which is only possible using radionuclides. A new generation of radioactive tests based on a study of uptake and also on a study of other renal functions may provide dynamic or quantitative data which physician urgently need. (Atomindex citation 10:463349)

HRP-0101701/1 PC **A15**/MF **A01**
Orkand Corp., Silver Spring, MD.
Operational Measures for Health Systems Characteristics,
Stephanie A. Hadley, Jane Kinsman, Arthur B. Janovsky, and Michael H. Kirlin. Sep 79, 331p DHEW/PUB/HRA-79-14032, BHP/HPMTS-17
Contract PHS-HRA-230-76-0251
Supersedes HRP-0900313.

The reference document for State and local health planning agencies considers the health system characteristics of availability, accessibility, cost, quality, continuity, and acceptability. These characteristics are intended as guides in determining baseline data on health system performance, in identifying trends and existing or potential problems, and in forecasting the performance of the health system with regard to plan development and plan implementation functions of health systems agencies. The detailed examination of health system characteristics, accompanied by numerous exhibits, focuses on two main areas: health services, such as community health promotion and protection, prevention and detection, diagnosis and treatment, habilitation and rehabilitation, maintenance services, and personal health care support; and health care settings, such as home, mobile, ambulatory, short-stay inpatient, long-stay inpatient, and free-standing support settings. Guidelines for the application of operational measures embodied in health system characteristics are presented, and data concerns and requirements are identified. Appendixes contain forms and questions for data collection on operational measures and other information relevant to health planning, and a list of selected references.

HRP-0201701/0 PC **A03**/MF **A01**
Bureau of Health Planning, Hyattsville, MD.
Developing Community Support. A Conference on Public Information Activities in Health Planning.
Nov 79, 47p DHEW/PUB/HRA-80-14005, BHP/HPIS-17

At a one-day conference in Washington, D.C., representatives from several Regional Offices and Health Systems Agencies (HSAs) met with public information staff of the Health Resources Administration to share ideas and approaches for developing a community base for health planning activities. This booklet is an abridged record of some of the informal discussions on setting health planning priorities and how to involve people in planning, organizing and developing various objectives and issues. Public information tools available to an HSA were an important part of the conference, and public service radio announcements developed by the Oklahoma Health Systems Agency were played and included in the transcript for audiovisual presentation. Ways in which the HSAs might be helped in developing some of their own public relations materials were explored.

HRP-0201801/8 PC **A11**/MF **A01**
Bureau of Health Planning, Hyattsville, MD.
Program Policy Notices of the Bureau of Health Planning (1979).
Nov 79, 244p DHEW/PUB/HRA-80-14001, BHP/HPIS-18
See also HRP-0201201.

Program Policy Notices issued by the Bureau of Health Planning, DHEW, for fiscal year 1979 are compiled as a compendium of reference for Health Systems Agencies (HSAs), State Health Planning and Development Agencies (SHPDAs), and others involved in health planning. Included are guidelines for development of the Health Systems Plan (HSP), Annual Implementation Plan (AIP), State Medical Facilities Plan (SMFP), and agreements between HSAs and A-95 Clearinghouses, as well as regulations for review of new institutional health services and proposed uses of Federal funds. Notices also relate to agency staffing for consumers and governing body composition, written ballots and public meetings, certificate of need and section 1122 program project reviews, computed tomographic scanning, and energy conservation.

HRP-0201901/6 PC **A09**/MF **A01**
Bureau of Health Planning, Hyattsville, MD.
Program Information Letters of the Bureau of Health Planning (1979).
Nov 79, 191p DHEW/PUB/HRA-80-14004, BHP/HPIS-19
See also HRP-0201101.

Program Information Letters are the principal means by which the Bureau of Health Planning, DHEW, announces new publications, technical assistance materials, and general health planning information. They are instrumental in the implementation of the National Health Planning and Resources Development Act of 1974 (P.L. 93-641) and the Health Planning and Resources Development Amendments of 1979 (P.L. 96-79). The Letters issued for the fiscal year 1979 have been compiled in this compendium for easy reference by staff and governing body members of State and local health planning agencies and other interested persons in the health care field. Where attachments to the Program Information Letters are brief and not readily attainable, they are included in the compendium. Availability is cited for all subject documents in the publication.

HRP-0900601/6 PC **A25**/MF **A01**
North Carolina Univ. at Chapel Hill. Dept. of Epidemiology.
Assessing the Clinical Skills of Nurse Practitioners,
Michel A. Ibrahim, Edward H. Wagner, Carolyn A. Williams, Robert A. Greenberg, and David G. Kleinbaum. Jun 78, 580p
Contract N01-NU-2-4000

Methodologies were developed to assess the competence of nurse practitioners in clinical decisionmaking and communication skills. The decisionmaking skills were evaluated for two conditions: acute respiratory infections in children and hypertension in adults. The criteria were collected from a questionnaire sent to three groups of physicians; when all three groups agreed on a certain action or nonaction for a specified condition, a consensus was reached. The nurse practitioners were then judged by their responses to the consensus criteria, which were weighted by such factors as criticality or clinical relevance. Communication skills involve predictive empathy, the ability to accurately perceive and judge others. Communication competence was evaluated for two different conditions: well infants' first year of life and ambulatory adults suffering chronic illness. Communication ability was measured by assessing practitioners' interpersonal effectiveness and empathy to patient- and family-oriented concerns. Questionnaires were completed by patients and nurses; responses indicated the degree of congruence. Both study approaches were deemed operationally feasible; however, validity activities and feedback measures are recommended. Tables and figures are provided, as well as 31 appendixes, including a bibliography of nurse practitioner literature.

HRP-0901397/0 PC **A09**/MF **A01**
American Association for Respiratory Therapy, Dallas, TX.
Development of a Performance Evaluation Tool for On-The-Job Competency Appraisal for Respiratory Therapists. Subproject III,
Andrew S. Block, and Michael L. Jouett. Jun 78, 184p
Contract PHS-HRA-231-75-0213

The development of a criterion-referenced clinical evaluation model and its application for evaluating respiratory therapy clinical skills are reported. The appraisal instrument was designed so that raters could measure a practitioner's performance by direct observation. A standard rater training procedure was developed. The evaluative instrument is designed to be diagnostic, giving each practitioner a score that can be compared against a standard. The emphasis on reliable, objective measurement by standardized methods ensures equal and fair evaluation for all practitioners. The model was tested at a rater training workshop. Objective and clinical simulation examinations were compared to a direct performance based evaluation mechanism. The rater training manual is provided, along with descriptions of eight scales used to assess respiratory therapists and a checklist. Effective rating of clinical performance is enhanced if atten-

tion is paid to those conditions that contribute to objective rating. Raters' knowledge needed for responsible evaluation includes: a thorough understanding of the evaluation instrument; knowledge of the skill to be rated; an awareness of common rater errors; and adherence to the routine of the test condition.

HRP-0901693/2 PC A07/MF A01
Resources Research Corp., College Station, TX.
Labor Substitution and the Economics of the Delivery of Dental Services.
Final rept. 1 Oct 77-30 Sep 78,
T. R. Saving, R. C. Battalio, A. S. De Vany, W. L. Gramm, and D. R. House. 1978, 133p
Contract PHS-HRA-231-77-0135

Labor substitution in the delivery of dental services and the impact of such substitution on fees and returns in dentistry are examined. A theoretical model capable of organizing existing data on the dental industry was developed by extending the existing supply and demand model of the dental industry to include patients' time and the uncertainty regarding patients' arrival and procedure time. Investigation of the relationship between fees or dentist density and appointment and office waiting time indicated a strong correlation between fees and waiting, wherein increases in the provider-population ratio implies increased availability and lower total costs of dental services. The model was also used to investigate the effects of legal restrictions that limit the use of dental auxiliaries on the organization of production, the fee structure, and the demand for dentists and auxiliaries. Restrictions that limit the use of dental auxiliaries per dental office, and those which limit the functions that chairside assistants can perform, result in the underuse of auxiliary personnel and the overuse of dentists relative to the unconstrained case. State restrictions on the use of paraprofessionals do not affect the practice of dentistry, implying that such restrictions are not enforced nor enforceable, or that such restrictions actually follow dental practice.

HRP-0901710/4 PC A02/MF A01
Northern Indiana Health Systems Agency, Inc., South Bend.
Amish of Northern Indiana,
Gail Barbieri. May 79, 25p
Sponsored in part by Bureau of Health Planning, Hyattsville, MD.

The extent of the Amish population in northern Indiana, their utilization of health services, and their unique health status problems were investigated. It was hypothesized that the Amish would be less likely to utilize medical facilities and emergency services, that the most common mode of payment would be self-payment, that Amish children would not often be immunized, and that genetic illnesses would be more prevalent than in the general population. An overview of the Amish population is given which highlights differences from the general population. There are approximately 13,000 Amish people in four northern Indiana settlements. This population has a greater percentage of young people. The Amish tend to marry later, bear more children, and have more twin births than the general population. Men tend to outlive their spouses rather than the reverse. Of the hypotheses, those concerning utilization of services were disproved. Immunization was found to be on the increase for children. It was found that nursing homes were not utilized by the Amish, who care for the elderly at home. Phenylketonuria and limb-girdle muscular dystrophy are identified as genetically transmitted diseases more prevalent among the Amish. A table comparing mortality rates of the Amish and the non-Amish in northern Indiana is presented.

HRP-0901713/8 PC A05/MF A01
Southeast Nebraska Health Systems Agency, Lincoln.
Annual Implementation Plan for 1979. Health Service Area 2 Nebraska.
1979, 85p
Sponsored in part by Bureau of Health Planning, Hyattsville, MD. See also HRP-0901716.

The annual implementation plan (AIP) of the Southeast Nebraska Health Systems Agency is intended to improve the health of all residents in the 17-county area served. The most significant health problems are cancer of the respiratory organs, digestive organs, and peritoneum; cerebrovascular disease; chronic disabilities; heart disease; and motor vehicle accidents. High priority actions in health planning focus on prevention and education services and on improving health service distribution. These actions pertain to the development of colorectal cancer education and screening programs, the recruitment of primary care physicians in rural areas, the development of preventive services such as health education, and the further refinement of patient education programs. Other actions of priority include diabetes and hypertension education and screening, childhood immunizations, coordination of prevention and detection services, availability of ambulatory services (including outpatient alcoholism services), availability of physical therapy services, availability of telecommunications between rural and metropolitan areas, uniform reporting of outpatient surgery, and cardiopulmonary resuscitation. Priorities in the AIP are ranked according to first, second, or third priority levels, and short-range objectives and recommended actions are delineated.

HRP-0901716/1 PC A99/MF A01
Southeast Nebraska Health Systems Agency, Lincoln.
Health Systems Plan for 1979-1984. Health Service Area 2 Nebraska. 2nd Edition.
1979, 741p
Sponsored in part by Bureau of Health Planning, Hyattsville, MD. See also report dated Mar 78, HRP-0901078.

The Southeast Nebraska health systems plan (HSP) is prefaced by introductory remarks on the statutory authority for health planning, responsibilities of the health systems agency, the HSP's purpose and use, and planning policies. A general description of the health service area indicates demographic, social, economic, and geographic characteristics. Goals, objectives, long-range recommended actions, and resource requirements are specified for health status and the health system. Health status is concerned with cardiovascular disease, cerebrovascular disease, heart disease, artheriosclerosis, cancer, influenza and pneumonia, diabetes mellitus, emphysema, cirrhosis of the liver, sentinel health events (preventable deaths), infant mortality, motor vehicle accidents, all accidents except motor vehicle, suicide, homicide, nutrition, dental problems, mental health, alcoholism, drug abuse, chronic disabilities, and life expectancy. The health system focuses on community health promotion and protection; prevention and detection (e.g., immunization and condition-specific screening); diagnosis and treatment, (e.g., acute care, obstetrical services, and surgical services); habilitation and rehabilitation (physical therapy and respiratory therapy); maintenance (home health, intermediate nursing care, and skilled nursing care); personal health care support (direct patient support and pharmacy services); and health system enabling services (regulation). Linkages between health status and the health system are discussed. A glossary, bibliography, and an index are included.

HRP-0901729/4 PC A07/MF A01
United Nations Children's Fund, Geneva (Switzerland).
Governments and the People's Health.
1978, 148p
International Conference on Primary Health Care held at Alma-Ata, USSR, on 6-12 September 1978.

Major problems still exist in the dissemination of primary health care to all populations, particularly to women and children. This special issue contains contributions by proponents of alternative and innovative approaches to primary health care. An equitable approach to health care is urgently needed, one that involves the participation of all governments. An understanding of traditional health services is necessary in order to effectively implement a new primary health care concept. It is suggested that socioeconomic determinants and consequences have a profound effect on health and disease. Programs in agriculture, education, commerce, and industry can be designed to assure improved health care services. A planning strategy for primary health care is presented, including what data are needed and what process should be used. The epidemiology and the economic status of each country must be considered. In addition, a reorientation of health personnel, an increase in community participation, and an integration of a primary health care program into the overall national development effort are essential for a health care system to be truly effective. Case studies of primary health care in Afghanistan and other countries are provided.

HRP-0901901/9 PC A09/MF A01
Abt Associates, Inc., Cambridge, MA.
A D and U Strategy for Health Planning Information,
Susanna Ginsburg, Rachel Schwartz, and Susan Windham. 8 Mar 76, 193p AAI-76-38
Contract PHS-HRA-230-75-0121
See also Executive Summary, HRP-0901903.

DHEW sponsored a project to facilitate the diffusion and utilization (D and U) of health planning information. After devising a theoretical basis and a conceptual framework for the D and U strategy, functions of a fully operating D&U system were identified: transmitting information from the resource or research and development community to potential users; transforming information so that it is usable; assisting users in system implementation; integrating the D and U system with the health planning knowledge base; and ensuring the utilization of information. Steps associated with system implementation concern the review of existing products, development of feedback procedures, orientation of users to the D and U system, feeding of products into the system, objective and priority setting, and resource allocation. Implementation issues are user needs, information collection, production, and communication. An overview of health planning and its environment at Federal, regional State, and area levels is presented. Supporting figures and tables are included. Appendixes contain a bibliography and further information on transforming and helping functions of the D and U system.

HRP-0902049/6 PC A13/MF A01
Kaiser Foundation Hospitals, Portland, OR. Health Services Research Center.
Provider Requirements, Cost Savings, and the New Health Practitioner in Primary Care: National Estimates for 1990.
Final rept.,
Jane Cassels Record, Stuart O. Schweitzer, Michael McCally, Robert H. Blomquist, and Benjamin D. Berger. 1979, 296p
Contract PHS-HRA-231-77-0077

Contents:
- Level of delegation;
- The productivity of new health practitioners;
- The relative costs of physicians and new health practitioners;
- Delegation in adult primary care--The generalizability of the HMO data;
- The potential effects of new health practitioners on number of physicians needed and on total provider costs;
- The significance of national health insurance for staffing and cost savings in primary care;
- Further research on new health practitioners--Which directions.

HRP-0902050/4 PC A09/MF A01
Urban Inst., Washington, DC.
Certificate of Need Litigation: 1966-1979. Case Briefs,
Albert F. Cacozza. Jul 79, 180p WORKING PAPER-1304-01
Grant PHS-1-R03-HS-03363-01

A comprehensive search for certificate of need litigation was undertaken and the National Health Lawyers Association, based in Washington, D.C., was of great assistance in obtaining many of the cases. Sometimes cases peripheral to certificate of need have been included because the facts or holdings have a bearing on broader regulatory issues. The case briefs were prepared by Albert F. Cacozza who gratefully acknowledges the help of Judith M. Feder, principal investigator of the project, and William G. Kopit of Epstein, Becker, Borsody and Green, consulting attorney. Karen Wolf, Marva Smith, Elizabeth Straus and Martina Pass all helped to prepare this manuscript. The cases are presented in chronological order and an ap-

pendix is included which provides a state-by-state case list. Additional products of this study will be legal analysis of the cases and case studies of the role of litigation in the regulatory process.

N80-21022/2 PC **A02**/MF **A01**
National Aeronautics and Space Administration, Washington, DC.
Glycerol Test in Diagnosing Increased Intralabyrinth Pressure.
B. Y. Limar, N. S. Mischanchuk, M. V. Kulikova, and V. I. Yermilova. Mar 80, 10p NASA-TM-76110
Contract NASW-3198
Transl. Into English from Zh. Ushnykh Nosovykh Gorlovykh Bolez. (USSR), No. 6, Nov. - Dec. 1979 p 55-59. Transl. By Scientific Translation Service, Santa Barbara, Calif.

The problem of increased intralabyrinth pressure as one of the causes of cochlear-vestibular disorders is discussed. A technique for conducting the glycerol test is presented.

N80-21024/8 PC **A02**/MF **A01**
National Aeronautics and Space Administration, Washington, DC.
Prophylaxis and Treatment of Seasickness.
M. Yefremenko. Mar 80, 7p NASA-TM-76108
Contract NASW-3199
Transl. Into English of Morsk. Sb. (USSR), No. 6, Jun. 1979 p 40-42. Transl. By Kanner (Leo) Associates, Redwood City, Calif.

Depending upon the dominant type of symptoms, seasickness is divided into three forms: nervous, gastro-intestinal, and cardiovascular. Various medications are recommended appropriate to these forms. The first goal is normalization of impaired system functions as well as metabolism and the electrolyte and acid-base condition of the organism. Dietary recommendations are made and specific suggestions on the use of physical exercise, including prophylatic vestibular training exercises.

ORNL/BCTIC-1/R1(Rev.) PC **A11**/MF **A01**
Oak Ridge National Lab., TN.
Directory of Computer Users in Nuclear Medicine.
J. J. Erickson, J. Gurney, and W. J. McClain. Sep 79, 226p
Contract W-7405-ENG-26

The Directory of Computer Users in Nuclear Medicine consists primarily of detailed descriptions and indexes to these descriptions. A typical Installation Description contains the name, address, type, and size of the institution and the names of persons within the institution who can be contacted for further information. If the department has access to a central computer facility for data analysis or time-sharing, the type of equipment available and the method of access to that central computer is included. The dedicated data processing equipment used by the department in its nuclear medicine studies is described, including the peripherals, languages used, modes of data collection, and other pertinent information. Following the hardware descriptions are listed the types of studies for which the data processing equipment is used, including the language(s) used, the method of output, and an estimate of the frequency of the particular study. An Installation Index and an Organ Studies Index are also included. (ERA citation 05:010619)

ORNL/TM-6771 PC **A02**/MF **A01**
Oak Ridge National Lab., TN.
Nuclear Medicine Technology. Progress Report for Quarter Ending December 31, 1978.
F. F. Knapp, Jr. May 79, 24p
Contract W-7405-ENG-26

Of special interest is the recent synthesis of /sup 117m/Sn-labeled 12,12-dimethyl-12-stannahexadecanoic acid. Although tissue distribution studies with this potential myocardial imaging agent demonstrated only marginal heart uptake of radioactivity, these studies are important since they clearly demonstrate that tissue-specific /sup 117m/Sn-labeled agents can be prepared. High-quality heart scans in rats that have been obtained following intravenous administration of /sup 123m/Te-labeled 9-tellurahepta-decanoic acid are also illustrated. Continuing studies with exp 11 C and /sup 195m/Pt are described. Additional patient studies with exp 11 C-DL-tryptophan and exp 11 C-1-aminocyclobutanecarboxylic acid (exp 11 C-ACBC) have further illustrated the usefulness of these agents for the positron emission tomographic imaging studies of the pancreas and tumor tissue, respectively. Studies of the reactor production of /sup 195m/Pt by the Szilard-Chalmers process have been completed. These studies have demonstrated that the preparation of high specific activity /sup 195m/Pt by the Szilard-Chalmers process using this technique is impractical. Finally, continued studies with the KB tumor cell diffusion chamber technique have shown that a dose-response relationship can be demonstrated following injection of both cyclophosphamide and cis-dichlorodiammineplatinum (II). These results suggest that the diffusion chamber technique could be an important tool to study the uptake and effects on cell growth of radiopharmaceuticals and other agents. (ERA citation 05:012574)

ORNL/TM-7072 PC **A03**/MF **A01**
Oak Ridge National Lab., TN.
Nuclear Medicine Technology. Progress Report for Quarter Ending September 30, 1979.
F. F. Knapp, Jr. 1979, 29p
Contract W-7405-ENG-26

Adrenal uptake in rats of /sup 117m/Sn-labeled 23-(trimethyl stanna)-24-nor-5 alpha -cholan-3 beta -o1 is demonstrated. The adrenal:blood and adrenal:liver ratios were 33:1 and 9:1, only one day after intravenous administration. A variety of /sup 117m/Sn-labeled steroids with structural modifications were also prepared to determine their effects on the adrenal uptake of these unusual steroids. Structural features required for significant adrenal uptake were determined. The diffusion chamber assay system has been assessed as a means of investigating the toxicity and biological fate of trace elements from energy technologies. In a preliminary experiment, the cell population in chambers from rats exposed to As sub 2 O sub 3 was inhibited 48% one day after treatment. The results of continuing studies with exp 75 Se, exp 11 C, and /sup 195m/Pt-labeled agents are also described. Several exp 75 Se-labeled long-chain fatty acids were prepared to determine heart uptake. Selenium-75-labeled 9-selenapentacosanoic acid showed the highest uptake of the compounds investigated. Preliminary radiation dose estimates have been performed for several exp 75 Se and /sup 123m/Te-labeled fatty acids. Tissue distribution and excretion data for exp 75 Se-labeled 9-selenaheptadecanoic acid and /sup 123m/Te-labeled 9-telluraheptadecanoic acid indicate that the human liver would recieve the highest absorbed radiation dose.Tissue distribution studies in rats with a series of /sup 195m/Pt-labeled chloroammine complexes have demonstrated that the tissue distribution and excretion characteristics of the chlorcammine complexes closely parallel their physicochemical properties. Further patient studies have assessed the efficacy of emission computerized tomographic organ imaging with exp 11 C-valine, and exp 11 C-aminocyclobutanecarboxylic acid (ACBC). (ERA citation 05:012575)

PB80-151368 PC **E02**/MF **A01**
National Institutes of Health, Bethsda, MD.
Compilation of Cancer Therapy Protocol Summaries. Fourth Edition.
Apr 80, 713p DHEW/PUB/NIH-80-1116
See also 3rd edition, PB-293 186.

This edition of the Compilation, previously known as the Compilation of Clinical Protocol Summaries, includes many of the protocols previously published separately as the Compendium of Tumor Immunotherapy Protocols. Each of the first fourteen sections contains open protocols concerning a specific disease or tumor site. Section 15 contains open protocols dealing with multiple tumor sites and types. All closed protocols are grouped together in Section 16 in the same order in which protocols appear in the first fifteen sections. Within each section the protocols are arranged alphabetically according to the following sequence: U.S. clinical cooperative groups and specific organ site study groups; NCI-funded contracts within the U.S.; Task forces; Grant-supported studies within the U.S.; and International group studies and other studies originating outside the U.S.

PB80-165202 PC **A22**/MF **A01**
National Inst. of Arthritis, Metabolism and Digestive Diseases, Bethesda, MD.
Proceedings of the Chronic Renal Disease Conference,
Nancy Boucot Cummings, Allen Arieff, Saulo Klahr, John Najarian, and R. W. Schrier. 2 Apr 80, 522p AK-1-1980

The proceedings of the Chronic Renal Disease Conference assess the state-of-the-art in fundamental and clinical research about chronic renal disease. The spectrum of biochemical and morphological manifestations, including mineral metabolism, Vitamin D, collagen and parathormone, are presented. Organ transplantation and pathophysiology, and immunosuppression with emphasis on total lymphoid irradiation and other clinical courses including drug regimens are discussed, as well as antigens and their role in graft rejection. Several pathogenetic mechanisms are explored and the clinical state-of-the-art of contrast nephrotoxicity is summarized. The antibiotic management of urinary tract infections in the presence of renal failure and in patients with renal cystic disease is assessed. Multifocal neurologic and cardiovascular complications of renal failure and the role of coronary artery disease are major factors in this complicated disease. This collection of manuscripts is a resource about the status of research in chronic renal disease.

PB80-165814 PC **A04**/MF **A01**
Connecticut Univ. Health Center, Farmington.
Clinical Evaluation of Group A and Group C Meningococcal Polysaccharide Vaccines in Infants and Children.
Final rept. 1 Dec 77-1 Aug 79,
Ronald Gold, Martha L. Lepow, and I. Goldschneider. 1 Aug 79, 75p DAB-VDP-09-114
Contract N01-AI-2-2502

A cohort of infants, previously immunized once or twice between 3-12 months of age with groups A and C meningococcal polysaccharide vaccines, received boosters at 2 and 5 and one half years of age with bivalent A/C vaccine. Antibody concentrations were measured by a radioactive antigen binding assay. Anti-A and anti-C concentrations were 5.59 and 2.86 micrograms/ml, respectively, by 4 years of age. After booster immunization at 5 and one half years of age, anti-A and anti-C antibody may be achievable throughout early childhood by routine immunization with the A vaccine. Although the group C vaccine is effective in epidemic control, the rapid decline of anti-C concentration following immunization of young children suggests that protection may not be long-lasting.

PB80-165897 PC **A03**/MF **A01**
Texas Univ. Health Science Center at Houston.
The Establishment of an Infectious Enteric Disease Study Center.
Annual rept. Sep 78-Sep 79,
Herbert L. DuPont. 1 Sep 79, 39p DAB-VDP-09-112
Contract N01-AI-7-2534

72 families and 6 day care centers (DCC) in Houston were selected for surveillance of diarrhea and transmission of known enteropathogens. Diarrhea occurred throughout the year in Houston primarily affecting younger children (especially due to rotavirus, giardia and salmonella). Shigellosis tended to occur in older children. Infants experienced on the average 2 bouts of diarrhea during the year with rates for siblings of 0.4 and adults 0.2 episodes per year. In the families under study there were 26 outbreaks and in nearly all cases the infant was the index case. Transmission of enteropathogens from children in DCC to their corresponding families occurred in 11% of cases. Secondary spread of diarrhea was unusual when an enteropathogen was not detected. Laboratory studies have confirmed the importance of adhesion fimbriae as virulence pproperties of TEC. These colonization fimbriae can be screened due to their specific properties of hemagglutination. Certain E. coli serotypes, not generally considered as EPEC's strains, termed facultatively enteropathogenic E. coli (FEEC) were associated with diarrhea in infants under study.

PB80-166523 PC **A02**/MF **A01**
National Center for Health Statistics, Hyattsville, MD.
Infant Mortality.
Statistical notes for health planners 1960-73,
Joel C. Kleinman. Jul 76, 14p SNHP-2

The report discusses the definition of neonatal, postneonatal and infant mortality and shows how they relate and differ from each other. It also shows infant mortality rates in two counties in Michigan.

PB80-166531 PC **A02**/MF **A01**
National Center for Health Statistics, Hyattsville, MD.
Mortality.
Statistical notes for health planners 1970,
Joel C. Kleinman. Feb 77, 18p SNHP-3

The report discusses some of the determinants of mortality such as age, occupation, heredity, and personal habits. It also shows sources of data and uses of data in planning.

PB80-166549 PC **A02**/MF **A01**
National Center for Health Statistics, Hyattsville, MD.
Mental Health Demographic Profile for Health Services Planning.
Statistical notes for health planners,
Earl S. Pollack. Mar 77, 13p SNHP-4

The purpose of this note is to describe the mental health demographic profile and to give an example of its use for mental health planning as an illustration of its application to health planning in general.

PB80-166556 PC **A02**/MF **A01**
National Center for Health Statistics, Hyattsville, MD.
Migration.
Statistical notes for health planners 1960-70,
Cecilia A. Young. Dec 77, 14p SNHP-5

The note explains the different definitions of immigration, emigration, and net migration, and how they all differ from each other. It shows patterns of population change since 1970, the reasons for this change, and how they arrived at the figures they got.

PB80-166564 PC **A02**/MF **A01**
National Center for Health Statistics, Hyattsville, MD.
Cause-of-Death Data.
Statistical notes for health planners 1968-72,
Theodore D. Woolsey. Feb 78, 18p SNHP-6

The note deals specifically with the usefulness of mortality statistics by cause of death to health planners. This report also discusses the reliability of data, sources of data and calculation of cause specific death rates.

PB80-166895 PC **A03**/MF **A01**
Research Foundation of Children's Hospital, Washington, DC.
Establishment of an Infectious Enteric Disease Study.
Annual rept. 1 Jul 78-20 Jun 79,
Robert H. Parrott, William J. Rodriguez, Carl D. Brandt, and Hyun Wha Kim. 29 Aug 79, 27p
DAB-VDP-09-111
Contract N01-AI-7-2535

From 1974-79, human rotavirus (HRV) type 1 or 2 adenovirus, or noncultivatable 27 nm virus-like particles were demonstrated by electron microscopy (EM) and/or HRV ELISA in fecal samples from 44% of 744 gastroenteritis pediatric inpatients, 25% of 247 gastroenteritis outpatients and 5% of 994 control subjects. 85% of the infections were HRV (75% type 2). HRV was detected most often in January and in infants 10-12 months of age. Adenoviruses were detected significantly more frequently in gastroenteritis than control subjects but this was not so for 27 nm viruses. Direct EM detected 88% HRV's, 92% adenoviruses and 47% of 27 nm virus. ELISA was the most sensitive method for HRV detection. In a prepaid group practice, 1 in 272 (3.7/1000) infants under 1 year of age and 1 in 341 (2.2/1000) 13-24 months of age were hospitalized for rotavirus infection. In a longitudinal family study 1.35 gastrointestinal illnesses/year were observed in those 6 through 11 months of age. 350 HRV infections per 1000 children aged 12 through 23 months per year were estimated to occur in this population. Measurable HRV serum antibody (Ab) was lost during the first 6 months of life. From 3 to 5 years of age, 75% of children had HRV Ab. and 14% Norwalk Ab; from 5-15, 75% had HRV Ab. and 25% Norwalk Ab. 95% of adults had HRV Ab. and 73% had Norwalk Ab. 7.6% of 225 gastroenteritis patients and 3.1% of 194 controls had LT producing coliforms recovered from stools (P = <.05).

PB80-167364 PC **A04**/MF **A01**
Michigan Univ., Ann Arbor. Dept. of Epidemiology.
Establishment of an Infectious Enteric Disease Study Center.
Annual rept. 30 Sep 78-31 Aug 79,
Arnold S. Monto, and Edward A. Eckert. Aug 79, 54p DAB-VDP-09-110
Contract N01-AI-7-2536

Frequency and etiology of infectious enteric illnesses have been studied in Tecumseh, Michigan and other population groups. Rotaviruses were by far the agent most commonly identified. Most of the identifications of the virus were in stools or rectal swabs collected during the winter season from children under 2 years or from parents. By serology, it was possible to detect reinfections in individuals of all ages, especially school-age children. A serum titer of 1:16 or greater by CF seemed to correlate with protection from reinfection. Respiratory symptoms were significantly associated with a portion of enteric illnesses, especially the more severe ones. This association was present in all seasons and in rotavirus positive and rotavirus negative illnesses. However, there was evidence that diarrheal episodes associated with rotavirus illnesses were more severe than those not so associated. Pathogenic bacteria were found in only 3.3 per cent of stools from individuals with enteric illness. First in frequency among the bacteria was Salmonella enteritidis, isolated from 7 of the 584 stools studied. Next most commonly encountered were the enterotoxigenic E. coli. None of these isolates were both LT and ST positive, and none produced a known colonization factor. LT-ST positive strains received from overseas also have not uniformly demonstrated either CFA/1 or CFA/2, thus suggesting the presence of additional human colonization factors of importance in pathogenesis.

PB80-167414 PC **A03**/MF **A01**
California Univ., Los Angeles. Dept. of Pediatrics.
Influenza Studies: Vaccine Trials, Anti-Influenza Compounds Trials, Virologic Surveillance and Clinical Surveillance.
Annual rept. 19 May 78-18 May 79,
James D. Cherry, Yvonne J. Bryson, and Mary J. Spencer. 13 Mar 79, 43p DAB-VDP-05-88
Contract N01-AI-6-2510
See also PB-297 244.

Studies of clinical and serologic responses following immunization with whole virus and split product monovalent (A/USSR/77) and trivalent (A/USSR/77-A/Texas/77-B/Hong Kong/72) influenza vaccines in children, adolescents and adults are reported. Implementation of one phase of the vaccine trials (children 6 mos. of age through 3 years of age) was delayed because of the unavailability of vaccine. Intake in this study is still in progress. Clinical surveillance during the study period revealed no unusual illnesses in previous recipients of A/NJ/76 influenza vaccines. Subtle side effects were noted in association with amantadine prophylaxis in young adults. During the study period, 651 influenza surveillance cultures were processed and 27 influenza A strains and seven influenza B strains were recovered.

PB80-168206 CP **T02**
National Center for Health Statistics, Hyattsville, MD.
National Survey of Family Growth, Cycle II (Interval File), 1976.
Data file,
William F. Pratt, and Gerry E. Hendershot. 1976, mag tape NCHS/DF-80/005
Source tape is in EBCDIC character set. Tapes can be prepared in most standard 7 or 9 track recording modes for one-half inch tape. Identify recording mode desired by specifying character set, track, density, and parity. Call NTIS Computer Products if you have questions. Price includes documentation, PB80-168214.

The National Survey of Family Growth (NSFG) was designed to provide data on fertility, family planning, and related aspects of maternal and child health. Fieldwork for Cycle II was carried out by Westat, Inc., between January and September of 1976. A multistage probability sample of the conterminous United States was used in Cycle II. Approximately 33,000 households were screened to identify the sample of women who would be eligible for the NSFG, i.e., women aged 15-44 years, inclusive, who were either currently married, previously married or never married but had offspring presently living in the household. For Cycle II, interviews were completed with 8,611 women.

PB80-168214 PC **A09**/MF **A01**
National Center for Health Statistics, Hyattsville, MD. Div. of Vital Statistics.
National Survey of Family Growth, Cycle II. Standardized Micro-Data Tape Transcripts, Tape Contents Manual (Interval File),
William F. Pratt, and Gerry Hendershot. 1980, 200p NCHS/DF-80/005A
For system on magnetic tape, see PB80-168206.

The National Survey of Family Growth, Cycle II was conducted in 1976 by Westat, Inc., under contract to the National Center for Health Statistics. Home interviews were conducted with 8,611 women 15-44 years of age who were married, previously married, or single with offspring in the household. The data have been used by the National Center for Health Statistics as the basis for a series of reports on the determinants and consequences of patterns of family formation and fertility in the United States. To make the data available to a larger number of persons, a standardized microdata tape transcript has been prepared for distribution. This Tape Documentation Manual describes that tape transcript; other items needed to use the tape transcript include the reel of magnetic tape containing the transcript itself and the interview schedule.

PB80-168222 CP **T02**
National Center for Health Statistics, Hyattsville, MD. Div. of Health Examination Statistics.
Health and Nutrition Examination Survey (HANES I) 1971-1975. Computer Measurements and Interpretations of Electrocardiograms, Catalog Number 4140.
Data file,
Wilbur Hadden, and Jean Roberts. 1975, mag tape NCHS/DF-80/004
Source tape is in EBCDIC character set. Tapes can be prepared in most standard 7 or 9 track recording modes for one-half inch tape. Identify recording mode desired by specifying character set, track, density, and parity. Call NTIS Computer Products if you have questions. Price includes documentation, PB80-168230.

The first Health and Nutrition Examination Survey (HANES I), conducted during the period 1971-1975, was designed to measure the nutritional status and health of the U.S. population ages 1-74 years and to obtain more detailed information on the health status and medical care needs of adults ages 25-74 years in the civilian noninstitutionalized population. The information obtained during the course of the survey consisted of: a detailed dietary interview; general medical histories and detailed histories of respiratory disease, cardiovascular disease, and arthritis; health care needs and general well-being questionnaire; a general medical examination; dental, dermatological and ophthalmological examination; anthropometry; vision tests and speech tests; x-rays of the hands, knees, hips and chest; blood and urinary laboratory tests; electrocardiogram; spirometry and pulmonary diffusion tests; and tap water samples. There were a total of 32,331 sample persons of which 31,973 were interviewed and 23,808 were examined. This data tape contains demographic characteristics and data from computer measurements and interpretations of electrocardiograms for 6,913 sample persons 25-74 years of age examined during HANES I.

PB80-168230 PC **A05**/MF **A01**
National Center for Health Statistics, Hyattsville, MD. Div. of Health Examination Statistics.
Health and Nutrition Examination Survey (HANES I) 1971-1975. Computer Measurements and Interpretations of Electrocardiograms, Catalog Number 4140.
Final rept. 1971-75.
Jan 80, 77p NCHS/DF-80/004A
For system on magnetic tape, see PB80-168222.

The first Health and Nutrition Examination Survey (HANES I), conducted during the period 1971-1975, was designed to measure the nutritional status and health of the U.S. population ages 1-74 years and to obtain more detailed information on the health status and medical care needs of adults ages 25-74 years in the civilian noninstitutionalized population. The information obtained during the course of the survey consisted of: a detailed dietary interview; general medical histories and detailed histories of respiratory disease, cardiovascular disease, and arthritis; health care needs and general well-being questionnaires; a general medical examination; dental, dermatological and ophthalmological examination; anthropometry; vision tests and speech tests; x-rays of the hands, knees, hips and chest; blood and urinary laboratory tests; electrocardiogram; spirometry and pulmonary diffusion tests; and tap water samples. There were a total of 32,331 sample persons of which 31,973 were interviewed and 23,808 were examined.

PB80-168362 PC **E03**/MF **E03**
International Inst. for Applied Systems Analysis, Laxenburg (Austria).
Strategic Control for a U. K. Regional Health Authority - A Conceptual Framework.
Final rept.,
Mark F. Cantley. c1978, 59p RM-78-54

After a brief review of the nature of strategic planning, and the problems of defining health service objectives, the paper concentrates on the question of 'strategic control', in the context of a regional health authority. The purpose of monitoring is defined in detail. A critical review of concepts of control in various disciplines considers their suitability to the health authority context. An integration of feed-forward and feedback control loops is developed, in order to meet the specific characteristics of a system in which 'environment' can be viewed as the 'input', and to provide the adaptive, learning capability which is required by the situation of insufficient data, ignorance of underlying mechanisms, and continuing change.

PB80-168552 PC **A02**/MF **A01**
Virginia Univ., Charlottesville. School of Medicine.
Influenza Surveillance and Clinical Evaluation of Influenza Vaccines.
Final rept. Jan 77-Aug 79,
Jack M. Gwaltney, J. Owen Hendley, and Frederick G. Hayden. Sep 79, 25p DAB-VDP-07-113
Contract N01-AI-2-2508
See also PB-294 782.

From 1/24/77 to 4/22/79, 1757 cultures were obtained (68% sampling) from children with febrile respiratory illness (RI). RI, half of which were febrile, accounted for 22% of sampling day visits. Influenza outbreaks occurred in all 3 years of the study. Sixty-one specimens were positive: 13 A/Victoria, 23 A/Texas, 5 A/USSR, 16 A/Brazil, and 4 B/HK. Twelve inactivated influenza vaccines were tested for acceptability and antigenicity in young adults in a collaborative project. Monovalent A/USSR/90/77 vaccine administration was followed by trivalent A/USSR, A/Texas/75, and B/HK/72 vaccine. Vaccines were well tolerated. Antigen concentrations of 7 or 20 micrograms of hemagglutinin per 0.5 ml IM dose gave equivalent seroconversion rates. Acceptability of amantadine (Am) and rimantadine (Rm) was compared in a double blind placebo (Pl) controlled study. Subjects took Rm or Am 200 mg (N=52) or 300 mg (N=196) per day in divided doses. Both drugs were well tolerated at the lower dose. At the higher dose 49% Am (<0.001) and 21% Rm (p=0.03 vs Pl,p=0.001 vs Am) subjects had moderate symptoms vs 6% Pl-treated subjects. No adverse effects on psychomotor performance were found.

PB80-168586 PC **A02**/MF **A01**
Jefferson Medical Coll., Philadelphia, PA.
Vibrio Reference Laboratory.
Annual rept. 5 Sep 78-4 Sep 79,
Harry L. Smith, Jr. Sep 79, 8p DAB-VDP-09-125
Contract N01-AI-3-2502

The Vibrio Reference Laboratory has two major functions to perform under the contract award. Briefly stated, it is to help workers in the identification of vibrio isolates by biochemical means and by use of a set of typing sera unique to the laboratory. In addition, it is to supply cholera typing sera to laboratories requesting them.

PB80-168800 PC **A02**/MF **A01**
Vermont Univ., Burlington.
Evaluation of Control Measurement for Influenza and Other Respiratory Viral Infections.
Annual rept. Apr 78-Apr 79,
Charles M. Poser, Charles A. Phillips, and Richard Reichman. 23 Feb 79, 7p DAB-VDP-04-79
Contract N01-AI-8-2563

Trivalent influenza vaccine was administered to 104 subjects under 45 years of age and 18 over 45 in 1978. These subjects and an age-matched cohort have been followed for their experience with natural influenza for the past two years. No remarkable long-term reactogenicity or adverse effects have been noted in the vaccines.

PB80-168909 PC **A03**/MF **A01**
Michigan Univ., Ann Arbor. Dept. of Epidemiology.
Studies on Cold Adapted Live Influenza Virus Vaccine Candidates.
Annual rept. 25 Oct 78-24 Aug 79,
H. F. Maassab, A. S. Monto, A. H. Hennessy, and G. D. Adams. Aug 79, 27p DAB-VDP-10-99
Contract N01-AI-7-2521
See also report dated Aug 78, PB-299 704.

Derivation and characterization of cold recombinant clones with surface antigens to new epidemic strains (A/Texas-like-H3N2 and A/USSR-H1N1) have been accomplished. Clones with different gene composition were developed, plaque-purified and volunteers pool made for field trials, in order to evaluate the gene constellation necessary for cold-adaptation and hence, attenuation. The isolates derived from field trials this year provided evidence for stability of the cold-adapted (CA) marker only. In some isolates, CA marker was retained while reversion to ts+ was evident. These isolates were attenuated upon administration to ferrets. A new rapid enzymatic procedure is being developed for derivation of cold mutants. The advantage so far, has been the possibility of developing stable cold variants in about four weeks. Data obtained in comparative analysis of AA-CR29-Clone 2, in two host systems, MDCK and PCKC, showed differences in temperature cut-off. Two clones, picked at 39C from infected MDCK line and considered ts+, were still ts in primary chick kidney cells (PCKC). Host restriction should be considered when evaluating of marker(s) of candidates of influenza virus vaccine. Recently clones to AA-CR37 (A/California-H1N1) and AA-CR39 (A/Fukushima-H1N1) were picked and are being evaluated.

PB80-169204 PC **A02**/MF **A01**
Texas Univ. at San Antonio. Center for Applied Research and Technology.
Assessment of the Potential Health Risks Associated with the Injection of Residual Domestic Wastewater Sludges into Soils. Final Report I. National Conference,
Bernard P. Sagik, Charles A. Sorber, Steven W. Funderburg, and Barbara E. Moore. 20 Feb 80, 21p 80-2, NSF/RA-800024
Grant NSF-ENV77-10187
See also Final Report II, PB80-169212.

The conference convened scientists, engineers, planners, and Federal, state, and local public health officials for the purpose of assessing the potential public health risks from pathogens and chemical compounds associated with the use of domestic wastewater and sludges on land. It provided an opportunity to evaluate existing data and to define the risks where the data were deemed adequate. A major theme was that current wastewater treatment chains, designed and operated appropriately, are probably adequate to reduce much of the potential biological public health hazard from wastewater effluents. Available data suggest that rather than inactivation, what occurs during treatment is sequestering of some of the microbiota and organics into the secondary biomass. The problem then becomes one of sludge handling. It is the problem of viruses which underlies much of the research and is the most commonly acknowledged single restraint on widespread and immediate use of municipal sewage effluents and sludges as potential assets.

PB80-169212 PC **A07**/MF **A01**
Texas Univ. at San Antonio. Center for Applied Research and Technology.
Assessment of the Potential Health Risks Associated with the Injection of Residual Domestic Wastewater Sludges into Soils. Final Report II. Laboratory Studies,
Bernard P. Sagik, Charles A. Sorber, Steven W. Funderburg, and Barbara E. Moore. 20 Feb 80, 142p 80-3, NSF/RA-800025
Grant NSF-ENV77-10187
See also Final Report I, PB80-169212.

Movement of poliovirus 1, reovirus 3, and bacteriophage 0X174 was studied in nine different soils and two soils amended with sludge. Soils were sampled to a depth of 100 cm in three 33 cm profiles. These profiles were packed into acrylic cylinders, 10 cm in diameter and 33, 66, and 100 cm in length, according to the vertical distribution and bulk density of the soil as found in the field. Viruses were added to the columns in 100 ml of autoclaved secondarily treated wastewater. Columns then were flooded with 800 ml of autoclaved wastewater followed by 800 ml of distilled water for five cycles of wastewater/distilled water application. Column percolates were monitored for viral infectivity, specific conductance, pH, turbidity, and total organic carbon. Cation exchange capacity, percent organic carbon, pH, percent silt/clay, and specific surface area were determined for each soil studied. Recovery of all three virus types in soil column percolates followed a cyclical pattern with a peak of viral release corresponding to a reduction in specific conductance of the percolates after distilled water application. In successively longer columns, the peaks of viral release were lower, and hence the total number of virions recovered from these percolates was less than from the shorter columns. The total number of viruses detected in the column percolates differed among the soils tested. Linear and multiple regression analysis determined that this was due to the differences among soil properties.

PB80-169220 PC **A03**/MF **A01**
Health Effects Research Lab., Research Triangle Park, NC. Population Studies Div.
Pilot Study of Ambient Air Pollution and Survival from Cancer,
Gregg S. Wilkinson, Peter A. Reese, and Roger L. Priore. Jan 80, 32p EPA-600/1-80-009
Prepared in cooperation wtih Roswell Park Memorial Inst., Buffalo, NY.

The study was concerned with investigating the potential influence exerted by ambient concentrations of particulate and sulfur dioxide air pollutants upon the length of survival for diagnosed cancer patients. Monitoring data from the National Aerometric Data Bank for particulates and sulfur dioxide were examined in conjunction with survival data from the Lake Area Regional Tumor Service Registry. Length of survival for respiratory cancer patients was found to be inversely related to maximum particulate levels. Survival times for patients who resided in areas where maximum particulate levels exceeded 240 micrograms/cu m were significantly shorter than for similar patients who resided in areas with lower particulate levels. Colorectal cancer patients demonstrated a similar trend that was not statistically significant. No association was found between survival of leukemia patients and particulate or SO2 levels, nor was SO2 related to survival of respiratory tract or colorectal cancer patients. These findings suggest that highly polluted air in residential areas may have a deleterious effect on the survival time of patients with certain types of neoplastic disease. Additional research is called for of the relationship between cancer survival and exposure to ambient air pollution, especially particulates.

PB80-169485 PC **A05**/MF **A01**
Rochester Univ., NY. School of Medicine and Dentistry.

Clinical Evaluation of Respiratory Viral and Bacterial Vaccines in Children and Adults.
Annual rept. 1 Jun 78-31 May 79,
R. Gordon Douglas, Jr., David W. Bentley, Robert F. Betts, Michael W. Brandriss, and Caroline Breese Hall. 1 May 79, 91p DAB-VDP-05-103
Contract N01-AI-2-2503
See also PB-299 123.

This contract is concerned with the testing of vaccine candidates for respiratory infection. The influenza, parainfluenza and respiratory syncytial virus (RSV) studies have been done with attenuated influenza and inactivated influenza vaccines. Studies were also conducted on the natural history of RSV infection in adults. Studies on the natural history of RSV in children were also done. Patients with RSV infection were evaluated for interferon production and antibody production. Studies on the antiviral amantadine for use in influenza were also conducted. Finally, epidemiologic studies of the population with regard to viruses of the respiratory tract were maintained.

PB80-169501 PC **A02**/MF **A01**
Medical Coll. of Pennsylvania, Philadelphia. Dept. of Microbiology.
Production of Antisera to Interferons.
Annual rept. 30 Jun 78-29 Jun 79,
Kurt Paucker, Michael Balsai, and Kathy Kinch.
15 May 79, 10p DAB-ASP-06-39
Contract N01-AI-8-2568

Four adult sheep were each injected with one of the following antigens: Mouse L cell interferon, human leukocyte interferon, mouse L cell interferon control and human leukocyte interferon control. Interferon antigens consisted of chromatographically purified (spec. act. 1-5 x 1,000,000 u/mg protein) and antibody-purified (spec. act. 3 x 10,000,000 u/mg protein) materials. Control antigens consisted of interferons depleted of antiviral activity by immune affinity chromatography. Injections were administered subcutaneously at multiple sites according to schedules defined in the report. To date about 1,200 ml of high titered anti-mouse interferon, 500 ml of anti-human leukocyte interferon and 500 ml of each of the control antisera have been collected. Immunoabsorptions of the anti-mouse interferon serum have been completed and antibodies to egg albumin, L cell extract and bovine plasma albumin were reduced by 70% to >99% of the initial titer. Neutralizing antibody activity was retained. Conditions for optimal lyophilization are being determined and negotiations are in progress to select the place best equipped to freeze-dry the globulin solutions in glass-sealed ampules.

PB80-169519 PC **A02**/MF **A01**
Boston City Hospital, MA. Lab. for Infectious Diseases.
Otitis Media Vaccine Trial.
Annual rept. 30 Jun 78-29 Jun 79,
Jerome O. Klein. 30 May 79, 6p DAB-VDP-06-91
Contract N01-AI-5-2536
See also report dated 31 Mar 76, PB-263 567.

Over 2500 children are being followed prospectively from birth to determine the epidemiology of otitis media. From these the authors selected children who were aged six to 21 months who had had three episodes of acute otitis media. If parenteral consent was obtained, the authors administered one of two pneumococcal vaccines to 125 children. No child experienced a severe reaction to the vaccination. Vaccines are followed regularly and those developing acute otitis media undergo tympanocentesis to determine the bacterial pathogens responsible. The authors obtain sera before and after vaccination as well as before and after otitis media. Vaccinees, other children with severe recurrent otitis media and suitable controls have been offered audiologic evaluation at age two years and evaluation of speech and language at age three years.

PB80-169584 PC **A03**/MF **A01**
Colorado Univ. Health Science Center, Denver.
Vaccine Evaluation and Surveillance.
Annual rept. 1 Mar 78-30 Apr 79,
Kenneth McIntosh. 4 Jun 79, 35p DAB-VDP-05-102
Contract N01-AI-2-2501
See also report dated 28 Jan 77, PB-294 808.

The contractor has performed studies of respiratory viral vaccines and bacterial polysaccharide vaccines. Respiratory viral studies have emphasized diagnostic methods (use of new tissue culture systems, ELISA, new rapid typing methods), pathogenesis (including studies of secretory antibody), epidemiology (influenza surveillance) and prevention (including one study of amantadine in asthmatic children and one study of prevention of nosocomial spread of respiratory syncytial virus). Respiratory viral vaccine studies were devoted to trials of killed influenza vaccines in children and adults. During the past year we studied pneumococcal polysaccharide vaccine in a small group of children with the nephrotic syndrome.

PB80-169618 PC **A12**/MF **A01**
Vanderbilt Univ., Nashville, TN.
Evaluation of Respiratory Viral Vaccine Candidates in Children.
Annual rept. Jun 77-Jun 79,
Peter F. Wright, and David T. Karzon. 1 Jun 79, 253p DAB-VDP-06-104
Contract N01-AI-2-2507

Trials of live, attenuated intranasally administered influenza vaccines in children were performed using influenza A/Victoria and A/USSR prototype vaccines. Both temperature-sensitive and cold-adapted A/USSR vaccines were compared. Vaccine virus shedding and seroconversion were more commonly seen with the cold-adapted, CR 35 than with the temperature-sensitive, ts-1A2 strain. No definable clinical illness was seen with either vaccine and both continue to represent promising candidates for further trials. Further definition of the natural history of influenza has been carried out with demonstration of substantial protection against reinfection afforded by prior natural infection with a related strain and diminished virulence of A/USSR (H1N1) when compared with A/Texas (H3N2) infection in young children.

PB80-171036 PC **A03**/MF **A01**
Rochester Univ., NY. School of Medicine and Dentistry.
Studies on 'Hemophilus influenzae' b Vaccine.
Annual rept. 6 Feb 78-30 May 79,
Porter Anderson, Richard A. Insel, and David H. Smith. 30 May 79, 29p DAB-VDP-02-95
Contract N01-AI-7-2523
See also report dated 15 Apr 77, PB-297 238.

As a reference laboratory the authors assayed total antibodies to the capsular polysaccharide of Hemophilus influenzae b (PRP) in 144 sera of primates in a DAB-sponsored study at the Delta Primate Center. Methods were devised for Ig class-specific assay of anti-PRP antibody; preliminary results indicate that human adults vaccinated with PRP respond in the IgG, IgA, and IgM classes while infants may respond primarily in IgM; Rhesus monkeys respond almost wholly in IgM. Methods were devised for assay of antibodies to lipopolysaccharide (LPS) of H. influenzae b. Human adults vaccinated with PRP-complex respond to its LPS component independently of its PRP component. PRP-complex was shown to contain less LPS than the crude outer membrane complex from which it is derived; however, the residual LPS is antigenically active.

PB80-171069 PC **A04**/MF **A01**
General Accounting Office, Washinton, DC. Health Resources Div.
Congressional Monitoring of Planning for Indian Health Care Facilities Is Still Needed.
Report to the Congress.
16 Apr 80, 58p HRD-80-28

In 1977, the Congress imposed a moratorium on hospital construction planned by the Indian Health Service, Department of Health, Education, and Welfare. GAO had reported that the Service's plans would create excessive bed capacity in the Navajo area. The Service was directed to improve its planning for the construction program, but it has only partially complied with the directive. The Service revised the way it determines the number of acute care beds needed, but GAO believes planning is still not adequate. Plans would still lead to construction of unneeded acute care beds in the Navajo area and could lead to excess beds elsewhere. The Congress should continue the moratorium until the Service fully complies with the congressional directive.

PB80-173792 PC **A12**/MF **A01**
Hospital del Nino, Panama City.
Salud Integral Y Medicina Comunitaria (Health and Medicine in the Community),
Jose Renan Esquivel. 1977, 263p
Sponsored in part by Agency for International Development, Washington, DC. Text in Spanish.

The report contains a collection of twelve research studies on different aspects of health and medicine, presented in various countries of Latin America. The areas covered are: health and medicine in the community; planned parenthood; health and human growth; future of pediatrics; health and human behavior; health and problems in the institutional pediatrics; health and medicine in Latin America; health and vital environment; health and medicine in developing areas; health and primary care in the communities; nutrition; and preparation of the pediatric residents.

PB80-174212 PC **A04**/MF **A01**
Geomet, Inc., Gaithersburg, MD.
Evaluation of the Improved Pregnancy Outcome Program: Variations to the Evaluation Methodology.
Final rept. 30 Sep 77-31 Oct 78,
Kathryn E. Fox, Michael D. Koontz, and Eugenia J. Riordan. 31 Oct 78, 58p GEOMET-HF-735, HSA-PEL-CHS-77-5-A
Contract PHS-HSA-240-77-0166

The purpose of the study was to evaluate states' activities associated with the Improved Pregnancy Outcome (IPO) program, utilizing an evaluation manual developed by GEOMET under a prior contract. Descriptive and statistical comparisons were made across programs implemented in five states which had received grants during the first year of funding. Comparisons were also made between the areas in which the five programs were operating and five similar areas without IPO resources. The evaluative results indicated that the IPO program met with mixed success during its first year of operation. Several programs experienced improvements in measures of pregnancy outcome and/or activity levels, but two of the programs made no measurable achievements. Despite some political problems, management problems, and hiring difficulties, the programs filled numerous gaps in the perinatal care systems surrounding their operation. Relative to areas without IPO resources, the IPO areas took more advanced steps toward development of a regionalized system of care and generally placed a greater emphasis on identification/care of high-risk patients, tracking of patients, and efforts to assess quality of care and monitor pregnancy outcomes. Recommendations were also provided to assist the future direction of the Federal IPO initiative.

PB80-809858 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
National Health Insurance: 1974-April, 1980 (Citations from the NTIS Data Base).
Rept. for 1974-Apr 80,
Mary E. Young. Apr 80, 289p
Supersedes NTIS/PS-79/0447 and NTIS/PS-78/0460.

The bibliography cites studies on the benefits, costs, administration, and impacts of national health insurance on the health care system of the United States. Analyses are given of the various plans submitted to Congress. Reports on the experiences of foreign countries with national health insurance programs are included. (This updated bibliography contains 282 abstracts, 73 of which are new entries to the previous edition.)

PB80-810518 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Blindness. 1964-May, 1980 (Citations from the NTIS Data Base).
Rept. for 1964-May 80,
Elizabeth A. Harrison. May 80, 229p
Supersedes NTIS/PS-79/0532 and NTIS/PS-78/0535.

The selected abstracts cover the blind and blindness as they relate to reading machines, rehabilitation, prosthetics and therapy. Abstracts on the physiology of blindness are not included. (This up-

dated bibliography contains 222 abstracts, 22 of which are new entries to the previous edition.)

PB80-810534 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Radiotherapeutic Agents and Techniques. 1976-May, 1980 (Citations from the NTIS Data Base).
Rept. for 1976-May 80,
Elizabeth A. Harrison. May 80, 229p
Supersedes NTIS/PS-79/0537 and NTIS/PS-78/0459. See also 1964-1975, NTIS/PS-78/0458.

Research reports are cited on the use of gamma rays, x-rays, protons, neutrons, heavy ions, negative pions, and radioisotopes in radiotherapy. The bibliography includes data on particle accelerators, dosimetry, and health physics. The effectiveness of radiation for the treatment of cancer and hyperthyroidism is emphasized. (This updated bibliography contains 222 abstracts, 56 of which are new entries to the previous edition.)

PB80-929606 PC**$5.25**/MF**$3.00**
National Cancer Inst., Bethesda, MD. International Cancer Research Data Bank.
Modification of Chemical Carcinogenesis in Model Systems.
Special listing.
25 Apr 80, 51p NCI/ICRDB/SL-338
Supersedes NTISUB/E/296-010.

The research areas include: Enhancement of chemical carcinogenesis in model systems; Inhibition of chemical carcinogenesis in model systems; Modification of chemical carcinogenesis in model systems by host factors; Other studies of modification of chemical carcinogenesis in model systems.

TID-3319-S8-PT1-PT2 PC**$35.00**/MF**$9.00**
Department of Energy, Oak Ridge, TN. Technical Information Center.
Nuclear Medicine: A Bibliography.
Sep 78, 1342p
See also TID-3319-S7.

References to 6208 publications related to nuclear medicine that have been added to the Department of Energy's information data base since July 1976 are contained in this bibliography. Documents dealing with therapeutic irradiation are included in the data base only if there is new information on the technique, if there is significant information on the effects on normal tissues, if evaluations are made of new radiation sources, e.g., pion beams, or if dose or dose distribution measurements are made. Information on uses of isotope tracers in medicine is included if a contribution is made to the technology of tracer usage. References to instrumentation used in nuclear medicine, such as that for detection of radiation or measurement of doses, are included. Extensive bibliographies or reviews are also included. The citations are arranged in subject categories as shown in the table of contents. Within a given category the arrangement is alphanumeric by report number. Citations of unnumbered documents are arranged in reverse chronological order after the reports. Each complete bibliographic citation is followed by a listing of the subject descriptors used to describe the content of the reference for machine storage and retrieval. In many cases clauses or phrases that elaborate the title are also included.

UCLA-12-1227 PC **A03**/MF **A01**
California Univ., Los Angeles. Lab. of Nuclear Medicine and Radiation Biology.
Epileptic Patterns of Local Cerebral Metabolism and Perfusion in Man Determined by Emission Computed Tomography of exp 18 FDG and exp 13 NH sub 3.
D. E. Kuhl, J. Engel, Jr., M. E. Phelps, and C. Selin. 1979, 44p
Contract EY-76-C-03-0012

Seventeen patients with partial epilepsy had EEG monitoring concurrent with cerebral emission computed tomography (ECT) after exp 18 F-fluorodeoxyglucose (exp 18 FDG) and exp 13 N-ammonia were given intravenously as indicators of local cerebral glucose utilization (LCMR/sub glc/) and relative perfusion, respectively. In 12 of 15 patients who had unilateral or focal electrical abnormalities, interictal exp 18 FDG scan patterns clearly showed localized regions of decreased (20% to 50%) LCMR/sub glc/, which correlated anatomically with the eventual EEG localization. These hypometabolic zones appeared normal on x-ray computed tomography in all but three patients and were unchanged on scans repeated on different days. In 5 of 6 patients who underwent temporal lobectomy, the interictal exp 18 FDG scan correctly detected the pathologically confirmed lesion as a hypometabolic zone, and removal of the lesion site resulted in marked clinical improvement. In contrast, the ictal exp 18 FDG scan patterns clearly showed foci of increased (82% to 130%) LCMR/sub glc/, which correlated temporally and anatomically with ictal EEG spike foci and were within the zones of interictal hypometabolism (3 studies in 2 patients). exp 13 NH sub 3 distributions paralleled exp 18 FDG increases and decreases in abnormal zones, but exp 13 NH sub 3 differences were of lesser magnitude. When the relationship of exp 13 NH sub 3 uptake to local blood flow found in dog brain was applied as a correction to the patients' exp 13 NH sub 3 scan data, local alterations in perfusion and glucose utilization were usually matched, both in the interictal and ictal states. (ERA citation 05:012587)

UCLA-12-1230 PC **A02**/MF **A01**
California Univ., Los Angeles. Lab. of Nuclear Medicine and Radiation Biology.
Regional Myocardial Blood Flow, Metabolism and Function Assessed Noninvasively by Positron Emission Tomography.
H. R. Schelbert, M. E. Phelps, E. Hoffman, S. Huang, and D. E. Kuhl. 1979, 24p
Contract EY-76-C-03-0012

Positron emission computed tomography is a new technique for the noninvasive measure of myocardial blood flow, mechanical function and, in particular, metabolism. The capability of this new study means is due to the technological innovations of the imaging device and the availability of radioactive tracers that are specific for blood flow and metabolism. The device permits recording of cross-sectional images of the left ventricular myocardium that reflect quantitatively regional tracer tissue concentrations. By employing tracer kinetic models this new technique permits the measurement of regional glucose and fatty acid metabolism of the heart. While already an important new tool for investigative studies into cardiac physiology and pathophysiology, the clinical utility of positron emission tomography remains to be defined. (ERA citation 05:014282)

UCLA-12-1234 PC **A02**/MF **A01**
California Univ., Los Angeles. Lab. of Nuclear Medicine and Radiation Biology.
Leukemia Accelerating (LAc) Properties of Retroviruses in AKR, SJL and CBA/H Mice.
E. F. Hays. 1979, 18p
Contract EY-76-C-03-0012

Retrovirus expression was studied in eight spontaneous lymphomas of SJL mice. We showed that viruses were present in all of the tumors; some N-tropic, some B-tropic and, in one instance, xenotropic viruses were found. Two of these virus preparations accelerated thymic lymphoma after inoculation of neonatal SJL mice. Cells from normal lymphohemopoietic tissues of 6-week-old AKR, SJL, and CBA/H mice were also evaluated for retrovirus expression. Viruses were found in all AKR and SJL tissues but not in those from CBA/H mice. In additional experiments, four AKR-derived viruses which were leukemia accelerating for AKR mice were tested by inoculation into neonatal SJL and CBA/H mice. Two of the virus preparations were associated with the development of early thymic lymphomas in SJL mice. None were lymphomagenic for mice of the CBA/H strain. We have proposed that genetic regulation of host immune response to viral proteins may explain these findings. (ERA citation 05:014288)

6F. Environmental Biology

AD-A082 480/5 PC **A02**/MF **A01**
Miami Univ FL Dept of Surgery
Preparation of Monolayer Cell Cultures from Frozen Human Tissues,
Alice J. Claflin, and Theodore I. Malinin. 1979, 4p
Contract N00014-75-C-0235, Grant PHS-CA-15480-05
Pub. in Tissue Culture Association Manual, v5 n2 p1095-1098 1979.

No abstract available.

AD-A082 542/2 PC **A04**/MF **A01**
Nalesnik Associates Inc Washington DC
An Analysis of Federal Legislative Jurisdictional Responsibilities for Toxic and Hazardous Materials.
Final rept.,
Richard P. Nalesnik, and Jerome R. Kearney. Feb 80, 64p
Contract EMW-00271

The purpose of this study is to provide research, analysis and summarization of federal agency jurisdictional responsibilities for toxic substances and hazardous materials as presently authorized under existing federal legislation. It is prepared for the Federal Emergency Management Agency to provide comprehensive and factual information to expedite decisions and implementation of emergency management procedures. The present body of toxic substances control statutes is the result of incremental legislation enacted principally over the last twenty years. Thirty-three major pieces of federal legislation are summarized, indicating jurisdiction shared by eleven separate federal agencies. The complex network of 'patchwork' legislative control of toxic substances and hazardous materials has potentially dangerous implications for quick and effective emergency management. (Author)

AD-A082 814/5 PC **A02**/MF **A01**
Army Medical Bioengineering Research and Development Lab Fort Detrick MD
Acid Hydrolysis of Military Standard Formulations of Diazinon,
W. H. Dennis, Jr., A. B. Rosencrance, W. F. Randall, and E. P. Meier. 1979, 16p
Pub. in Jnl. of Environmental Science and Health, ptB v15 ni p47-60 1980.

No abstract available.

BNL-26971 PC **A02**/MF **A01**
Manhattan Coll., New York. Lab. for Plant Morphogenesis.
Effects of Simulated Acid Rain on Growth and Yield of Soybeans and Pinto Beans.
L. S. Evans, and K. F. Lewin. 1979, 24p CONF-791090-3
Contract EY-76-C-02-0016
Symposium on potential environmental and health effects of atmospheric sulfur deposition, Gatlinburg, TN, USA, 14 Oct 1979.

In order to assess the degree of damage that acid rain has or might have on plants, experiments were performed to determine the change in seed yield of two agronomic crops, soybeans and pinto beans, after exposure to simulated rain of pH 5.7, 3.1, 2.9, 2.7, and 2.5. Moreover, the effects of simulated acid rain were determined on a variety of other experimental parameters to understand further how plants respond to this environmental stress. Simulated acid rain of pH 3.1 and below decreased the dry mass of seeds, leaves, and stems of pinto beans. On a percentage mass basis the decrease in seed yield was comparable to reductions in biomass of leaves and stems. The decrease in yield of pinto beans by simulated acid rain was attributed to both a (1) decrease in the number of pods per plant and (2) a decrease in the number of seeds per pod. In soybeans, simulated acid rain decreased the dry mass of both stems and leaves. Seed yield also decreased after treatment with rain of pH 2.5. However an increase in seed yield occurred when plants were exposed to rain of pH 3.1. A larger dry mass per seed was responsible for the larger dry mass of seed per plant. (ERA citation 05:010681)

CONF-791009-12 PC **A02**/MF **A01**
Argonne National Lab., IL.
Relative Risk Assessment and Projected Body Burdens: A Tool for Energy Use Management.
J. R. Gasper, and P. A. Dauzvardis. 1979, 13p
Contract W-31-109-ENG-38
International conference on energy use management, Los Angeles, CA, USA, 22 Oct 1979.

In the area of health assessment of the impacts of tradeoffs between health, economic, social, environmental and energy availability considerations, gaps exist in both methodology and information. This paper describes a method for dealing with human response to hazardous pollutants emitted by energy technologies and presents a sample application of the methodology. (ERA citation 05:011997)

COO-1156-117 PC **A04**/MF **A01**
Colorado State Univ., Fort Collins. Dept. of Radiology and Radiation Biology.
Radioecology of Natural Systems. Final Report, May 1, 1962-October 31, 1979.
F. W. Whicker. 31 Oct 79, 56p
Contract EY-76-S-02-1156

This is the final report to the US Department of Energy and its predecessors on Contract EY-76-S-02-1156 with Colorado State University. During the first five years of the program, investigations were focused on the accumulation of fallout radionuclides in a well-studied mule deer population in north-central Colorado. In 1967, the scope of the program was enlarged to include studies on radionuclide behavior in mountain lake ecosystems, radiation effects on a shortgrass plains ecosystem, and the combined effects of radiation and intraspecific competition on the pika (Ochotona princeps). In 1971, studies on the geochemistry of lead in an alpine lake and the foraging impact of grasshoppers were added to the diverse program. The summer of 1972 marked the beginning of the research program which was to dominate the effort for the duration of the contract, namely the behavior of plutonium in the terrestrial environs of the Rocky Flats plutonium facility near Denver, Colorado. This report is a general, qualitative summary of activities and major findings over the entire tenure of the program. (ERA citation 05:014227)

COO-2381-2 PC **A09**/MF **A01**
Johns Hopkins Univ., Laurel, MD. Applied Physics Lab.
Environmental Assessment of Chalk Point Cooling Tower Drift and Vapor Emissions.
E. A. Davis. Mar 79, 200p
Contract EY-76-C-02-2381

An assessment is provided of selected environmental effects of operating the cooling towers and stacks of Units No. 3 and No. 4 of the Potomac Electric Power Company's generating station at Chalk Point, Maryland. The emphasis is on the magnitude of salt deposition to the area surrounding the cooling tower due to saline water drift. A secondary but important consideration is the magnitude of salt loading due to saline drift from the stack which uses saline river water in scrubbing flue gases. This salt loading together with that of the ambient salt background is assessed for its effects on soils, crops, native vegetation and man-made structures. Other atmospheric effects examined are: enhancement of ground level fogging and icing, enhancement of precipitation, and the flight hazards to aircraft. A numerical model of drift deposition has been developed and validated against the data collected in the Dyed Drift Experiment at Chalk Point. Use of the available data model predictions indicate that with fulltime, full load operation of both 600 MW(e) units significant levels of salt deposition occur only on the plant site within 0.4 km of the source. The predicted maximum salt deposition rates are given. The effects on soils, crops and native vegetation are predicted to be negligible at off-site locations. Significant effects to foliage of dogwood is predicted to occur at the most impacted on-site locations. Corrosion of structures at these locations could be enhanced under conditions of heavy plant operation. Enhancement of ground-level fogging, icing, and precipitation is expected to be negligible for all conditions of plant use. Hazards to aircraft because of restricted visibility, turbulence, and icing of structures and engines are estimated to be very slight and of no consequence. (ERA citation 05:011842)

COO-2546-4 PC **A06**/MF **A01**
Marine Biological Lab., Woods Hole, MA.
Effects of Drilling Muds on Lobster Behavior. Progress Report, 1 January-1 October 1979.
J. Atema, L. Ashkenas, and E. Beale. 1979, 107p
Contract EY-76-S-02-2546

Drilling muds, used and discarded in great quantities during the drilling phase of exploration and production of oil wells, represent an unknown threat to the marine environment. The compositions of the muds vary greatly with drilling requirements. The toxicity of their components are largely unknown, but can range from apparently harmless to immediately lethal, as found recently in toxicity tests on a number of marine animals. This report contains eight sections, each describing an aspect of studies of lobster behavior, ecology, physiology and the effects of exposure to various levels of different drilling muds. (ERA citation 05:012655)

DOE/ET/28464-1(V.4) PC **A07**/MF **A01**
RPC, Inc., Austin, TX.
Analysis of Ecological Effects of Geopressured-Geothermal Resource Development. Geopressured-Geothermal Technical Paper No. 4.
Jul 79, 137p
Contract ET-78-G-05-5958

The activities involved in geopressured-geothermal resource production are identified and their ecological impacts are discussed. The analysis separates those activites that are unique to geopressured-geothermal development from those that also occur in oil and gas and other resource developments. Of the unique activities, those with the greatest potential for serious ecological effect are: (1) accidental brine discharge as a result of a blowout during well drilling; (2) subsidence; (3) fault activation and enhanced seismicity; and (4) subsurface contamination of water, hydrocarbon, and mineral reservoirs. Available methods to predict and control these effects are discussed. (ERA citation 05:013419)

DOE/EV/10026-1 PC **A02**/MF **A01**
Kansas Univ., Lawrence.
Development of a Center for Biosystmeatics Resources. Progress Report, November 1, 1978-October 31, 1979.
S. R. Edwards. Nov 79, 11p
Contract AC02-79EV10026

The objective in the development of a Center for Biosystematics Resources is to provide a centralized source of information regarding the biological expertise available in the academic/museum community; and the federal and state regulations concerning the acquisition, transport, and possession of biological specimens. Such a Center would serve to facilitate access to this widely dispersed information. The heart of the Center is a series of computer assisted data bases which contain information on biologists and their areas of expertise, biological collections, annotated federal regulations, and federal and state controlled species lists. The purpose of this three-year contract with the Department of Energy is to continue the updating and revision of these data bases, make the information they contain readily available to the Department of Energy, other government agencies, the private sector, and the academic community; and to achieve financial independence by the end of the three-year period. (ERA citation 05:014218)

DOE/SR/10018-1 PC **A06**/MF **A01**
Charles County Community Coll., La Plata, MD. Div. of Biological Sciences.
Site Management Plan: Douglas Point Ecological Laboratory.
B. L. Jensen, K. J. Miles, P. K. Strass, and B. McDonald. 17 Sep 79, 112p
Contract AS09-79SR10018

A portion of the Douglas Point Site has been set aside for use as an ecological monitoring facility (DPEL). Plans call for it to provide for long-term scientific study and analysis of specific terrestrial and aquatic ecological systems representative of the coastal plain region of the mid-Atlantic United States. Discussion of the program is presented under the following section headings: goals and objectives; management and organization of DPEL; laboratory director; site manager; monitoring manager; research manager; and, organizational chart. The seven appendixes are entitled: detailed site description; supplemental land use plan; contract between Potomac Electric Power Company and Charles County Community Collge (CCCC); research and monitoring projects initiated at the Douglas Point Power Plant site; advisory committees; facilities and equipment; and CCCC personnel resumes. (ERA citation 05:012517)

DOE/SR/10018-2 PC **A09**/MF **A01**
Charles County Community Coll., La Plata, MD. Div. of Biological Sciences.
Monitoring Plan for Long-Term Environmental Measurements at the Proposed Douglas Point Ecological Laboratory, Nanjemoy, Maryland.
B. L. Jensen, K. J. Miles, P. K. Strass, B. S. McDonald, and A. Nugent. 25 Sep 79, 181p
Contract AS09-79SR10018

The Douglas Point Ecological Laboratory has been set up at the site of a proposed power plant, which is to be powered by either nuclear, coal, or an alternate form of fuel. A plan for long-range monitoring of terrestrial ecosystems and atmospheric chemistry is presented. A site characterization study will be made initially. Chemical and physical soil profiles will be established with continuous measurement of soil moisture and nutrient content, as well as other parameters. Data sets will be established, reflecting changes in rainfall pH and rate of deposition through precipitation and dryfall sedimentation of Ca exp 2+ , Mg exp 2+ , K exp + , Na exp + , SO sub 43- , Cl exp - , NH sub 4+ , and NO sub 3- . Among other objectives are the development of new monitoring techniques that can be used to trace energy flow, nutrient transport, and radionuclide transport through all trophic levels to selected carnivores. The atmospheric monitoring plan is outlined as to system design and specifications; system installation, operation, and maintenance, data processing and reports; quality assurance program; and project organization. A discussion of administrative and operational monitoring costs is included. (ERA citation 05:010579)

HRP-0901737/7 PC **A03**/MF **A01**
World Health Organization, Copenhagen (Denmark). Regional Office for Europe.
Environmental Health Impact Assessment. Report on a WHO Seminar Held at Argostoli, Kefalonia, Greece on October 2-6, 1978.
EURO Reports and Studies 7.
1979, 45p
Sponsored in part by Health Resources Adminstration, Hyattsville, MD.

The relationship between the environment and economic development, particularly the consequences of development on human health is addressed in this report of a seminar. Conference participants considered a wide range of health components related to the overall process of environmental impact assessment. Case studies of assessment projects in several countries are presented. The keynote speaker emphasized that preventive measures are the most efficient. While such measures do not impede economic development, they do remove the negative effects of growth. This approach retains a high quality of life without stalling economic progress. The participants developed several conclusions and recommendations. They agreed that the environment is a prime determinant of human health. Economic development must include a comprehensive environmental impact assessment that utilizes all available technical, social, political, governmental, and scientific capabilities in order to produce an effective and efficient mechanism for preserving the health of the human species without undermining economic progress.

LBL-9636 PC **A02**/MF **A01**
California Univ., Berkeley. Lawrence Berkeley Lab.
Building a United States Data Base: Populations-at-Risk to Environmental Pollution.
S. T. Sacks, S. Selvin, and D. W. Merrill. Oct 79, 20p CONF-7906145-1
Contract W-7405-ENG-48
Conference on demographic and health information for aging research: resources and needs, Bethesda, MD, USA, 25 Jun 1979.

A series of collaborative studies on the effects of environmental pollution on health were undertaken. A major study, Populations-at-Risk to Air Pollution (PARAP), was initiated in 1976. In October 1978, this project was extended to consider other environmental hazards and was renamed Populations-at-Risk to Environmental Pollution (PAREP). The PAREP project is divided into three main

tasks: (1) creation of an integrated data base containing socioeconomic and demographic characteristics, air pollution levels for several important pollutants, and disease specific mortality statistics for the US on a county basis; (2) determination of populations at risk to various pollutants; and (3) analysis of possible associations between disease specific mortality and pollutant levels, taking into account socioeconomic and demographic variables. (ERA citation 05:012669)

PB80-166440 PC **A04**/MF **A01**
Wisconsin Univ.-Madison. Water Resources Center.
Integration of Biological with Thermal Criteria for Power Plant Design and Water Resource Use.
Technical completion rept.,
John J. Magnuson, Patricia A. Medvick, George W. Gallepp, Ronald J. Hall, and Paul W. Rasmussen. 1979, 64p WIS/WRC-80-02, W80-04289, OWRT-B-092-WIS(1)
Contract DI-14-31-0001-5133

The energetic consequences of heated effluent from a 220 MW generating plant on the growth and production of bluegill in a 1400 ha eutrophic lake were analyzed. The heated effluent altered temperatures of 1-2% of the lake surface area or 2.6% of its littoral zone. Average temperatures in the outfall area did not exceefall area. In winter bluegill released near the outfall tended to remain in the heated water and remained closer to shore than in other seasons. Growth of bluegill was compared between the outfall and reference area from measurements of fish held in each area in enclosures, and from growth simulation using a bioenergetic model for fish growth. Fish in cages usually grew more rapidly in the outfall, but simulated growth was slightly lower in the outfall area. A strong argument cannot be made for major effects of the heated effluent on growth. Based on the observed growth of caged fish and high population density in the outfall area, small bluegill in the littoral zone may have a 20% enhancement of production during summer. The results indicate that a small electric generating station in an urban area can use the local eutrophic lake as a source of once-through cooling water without negative effects on the growth and production of the dominant warm-water fishes.

PB80-167422 PC **A06**/MF **A01**
Research Triangle Inst., Research Triangle Park, NC.
Guides for Quality Assurance in Environmental Health Research.
Final rept.,
C. E. Tatsch, and Ferris B. Benson. Feb 79, 115p EPA-600/1-79-013
Contract EPA-68-022612

The document provides conceptual guidelines for the development, implementation and evaluation of research task quality assurance plans for staff of the Health Effects Research Laboratory (HERL/RTP) of the U.S. Environmental Protection Agency, Research Triangle Park, North Carolina. It is designed to assist project officers in applying quality assurance concepts to each phase of a research task, from the initial planning through final report preparation. It is designed to assist the management staff in evaluating these plans and their implementation, for intramural as well as extramural tasks. The guidelines describe the policy of HERL/RTP with respect to quality assurance, the structure of the quality assurance organization, and outlines specific quality assurance responsibilities for various staff positions. They also analyze the research task with respect to the various steps which project officers may take to ensure the highest possible data quality commensurate with resource limitations. Following this discussion, more specific guidelines relating to dosing activities and animal care are provided.

PB80-177140 PC **A16**/MF **A01**
Wyoming Univ., Laramie.
Bibliography of Aquatic Ecosystem Effects, Analytical Methods and Treatment Technologies for Organic Compounds in Advanced Fossil-Fuel Processing Effluents,
Michael D. Marcus, Harold L. Bergman, Duane A. Stoller, Stanley K. Brown, and Pat A. Molholt. Feb 80, 366p EPA-600/3-80-026
Contracts DOE-ET-77-S-03-1761, DOE-ET-78-C-03-1761

Advance fossil-fuel processing operations, including oil-shale retorting, coal gasification, coal liquifaction and tar-sands recovery, can result in chemically complex aqueous waste effluents. This bibliography compiles much of the recent literature (ca. 1970-1977) concerning effects of organic compounds in advanced fossil-fuel processing effluents when discharged into aquatic ecosystems, plus information available on analytical methods and treatment technologies for these organics. To compile the bibliography, nearly 500 organic compounds known to be constituents of fossil fuels and fossil-fuel processing effluents were crossed with a list of key words during a computerized search of six bibliographic data bases. The bibliography contains 1314 citations which are indexed by chemicals, key words, taxonomic categories and authors. This bibliography is intended especially for researchers working with advanced fossil-fuel processing effluents in aquatic environments, but may also be useful to those concerned with fossil-fuel processing effluents in terrestrial environments and to those working in pulp mill and pesticide research.

PB80-810237 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Biological Productivity in Fresh Water Environments. February, 1976-March, 1979 (Citations from the NTIS Data Base).
Rept. for Feb 76-Mar 79,
Elizabeth A. Harrison. May 80, 269p
See also 1964-January, 1976, NTIS/PS-77/0266.

Water pollution effects, ecology, ecosystems, seasonal variations, nutrients, eutrophication, food chains and limnology, as related to fresh water biological productivity, are the subjects covered by the selected abstracts of research reports in the bibliography. (This updated bibliography contains 259 abstracts, none of which are new entries to the previous edition.)

PB80-810245 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Biological Productivity in Fresh Water Environments. April, 1979-April, 1980 (Citations from the NTIS Data Base).
Rept. for Apr 79-Apr 80,
Elizabeth A. Harrison. May 80, 105p
Supersedes NTIS/PS-79/0308 and NTIS/PS-78/0293. See also 1964-January, 1976, NTIS/PS-77/0266 and February, 1976-March, 1979, PB80-810237.

Water pollution effects, ecology, ecosystems, seasonal variations, nutrients, eutrophication, food chains and limnology, as related to fresh water biological productivity, are the subjects covered by the selected abstracts of research reports in the bibliography. (This updated bibliography contains 98 abstracts, all of which are new entries to the previous edition.)

PB80-810252 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Ecology of the Marine Environment. April, 1978-March, 1979 (Citations from the NTIS Data Base).
Rept. for Apr 78-Mar 79,
Elizabeth A. Harrison. May 80, 62p
See also 1964-November, 1974, NTIS/PS-76/0238; December, 1974-March, 1976, NTIS/PS-77/0124; April, 1976-March, 1977, NTIS/PS-78/0274; and April, 1977-March, 1978, NTIS/PS-79/0320.

The selected abstracts of research reports cover salt water ecology of shellfish, fishes, aquatic plants, aquatic animals, and aquatic microorganisms. Estuary studies are included as are pollution effects, except for reports dealing with pesticides and oil pollution. (This updated bibliography contains 155 abstracts, none of which are new entries to the previous edition.)

PB80-810260 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Ecology of the Marine Environment. April, 1979-April, 1980 (Citations from the NTIS Data Base).
Rept. for Apr 79-Apr 80,
Elizabeth A. Harrison. May 80, 165p
Supersedes NTIS/PS-79/0321 and NTIS/PS-78/0275. See also 1964-November, 1974, NTIS/PS-76/0238; December, 1974-March, 1976, NTIS/PS-77/0214; April, 1976-March, 1977, NTIS/PS-78/0274; and April, 1977-March, 1978, NTIS/PS-79/0320.

The selected abstracts of research reports cover salt water ecology of shellfish, fishes, aquatic plants, aquatic animals, and aquatic microorganisms. Estuary studies are included as are pollution effects, except for reports dealing with pesticides and oil pollution. (This updated bibliography contains 158 abstracts, all of which are new entries to the previous edition.)

UCID-18147 PC **A03**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Cost and Effectiveness of Exercise Evacuations to Increase Radiological Emergency Preparedness.
E. Fischer-Colbrie. Dec 79, 33p
Contract W-7405-ENG-48

This investigation of the expected cost and effectiveness of exercise evacuations from the vicinity of nuclear power plants led to the following results and conclusions: the estimated total cost per person and day varies from $17.34 to $78.20. The motivation of the public to participate in drill evacuations appears to be very low. In contrast to popular beliefs actual evacuations from disaster areas other than nuclear have been carried out consistently in orderly fashion without drills. Nuclear radiation as an unfamiliar agent of threat is not expected to change this pattern. Exercise evacuations are very costly and virtually no increase in preparedness can be gained through their execution. (ERA citation 05:012000)

6H. Food

LA-8180-PR PC **A03**/MF **A01**
Los Alamos Scientific Lab., NM.
Environmental and Radiological Safety Studies: Interaction of exp 238 PuO sub 2 Heat Sources with Terrestrial and Aquatic Environments. Progress Report, July 1-September 30, 1979.
G. R. Waterbury. Dec 79, 45p
Contract W-7405-ENG-36

The containers for exp 238 PuO sub 2 heat sources in radioisotope thermoelectric generators are designed with large safety factors to ensure that they will withstand reentry from orbit and impact with the earth and safely contain the nuclear fuel until it is recovered. Existing designs have proved more than adequately safe, but the Office of the Assistant Director for Safety and Reliability of the Department of Energy Division of Advanced Systems and Materials Production continually seeks more information about the heat sources to improve their safety. The work discussed here includes studies of the effects on the heat source of terrestrial and aquatic environments to obtain data for design of even safer systems. The data obtained in several ongoing experiments are presented; these data tables will be updated quarterly. Discussions of experimental details are minimized and largely repetitive in succeeding reports. Compilations of usable data generated in each experiment are emphasized. These compilations include data from environmental chamber experiments that simulate terrestrial conditions, experiments to measure PuO sub 2 dissolution rates, soil column experiments to measure sorption of plutonium by soils, and several aquatic experiments. No reference to results cited in this report should be published without the explicit permission of the person in charge of this work. (ERA citation 05:014224)

PAT-APPL-824 777 PC **A02**/MF **A01**
Department of Agriculture, Washington, DC.
Preparation of Protein Concentrates from Whey and Seed Products.
Patent Application,
Robert M. Saunders, and George O. Kohler.
Filed 15 Aug 77, 14p PB80-168503

This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

Stable protein concentrates are prepared from whey and seed products by a process which comprises mixing the seed product and the whey, adding alkali to the mixture, and separating a juice containing soluble protein and suspended starch and fat therefrom. Then, the juice is treated to precipitate a protein concentrate either by adding acid to pH 5-6 and heating to 85-95C, or by adding acid to pH 3-4 and then adding sodium hexametaphosphate.

PB80-169543 PC **A06**/MF **A01**
North Carolina Univ. at Chapel Hill.
Reducing Wastewater from Cucumber Pickling Process by Controlled Culture Fermentation.
Final rept. 1975-79,
Linda W. Little, Jeffrey G. Wendle, Jeffrey Davis, Roert M. Harrison, and Samuel J. Dunn. Feb 80, 104p EPA-600/2-80-046
Grant EPA-S-804220
Prepared in cooperation with North Carolina Agricultural and Technical State Univ., Greensboro.

On a demonstration scale, the controlled culture fermentation process (CCF) developed by the U.S. Food Fermentation Laboratory was compared with the conventional natural fermentation process (NF) in regard to product quality and yield and volume and concentration of wastewaters. Weight of cucumbers, volume of water, and amounts of additives were recorded. pH, acidity, salinity, and temperature were closely monitored. After brining, brinestock quality was evaluated. The brinestock was then processed; spent brines and processing waters were collected. Volume and wastewater characteristics (salinity, BOD, N and P forms, residues) were determined for the waters and weight of brinestock was determined. The cucumbers were then packed using a conventional finishing procedure for whole dill pickles and hamburger dill chips. Yield of final product was determined. Acceptability of the finished products was evaluated by a panel.

PB80-169774 PC **A02**/MF **A01**
Denver Research Inst., CO. Office of International Programs.
Colombia: The Composite Flour Program,
James M. Miller. Dec 79, 21p
Contract AID/ta-C-1337
Report on Industrial Research Institutes: Their Role in the Application of Appropriate Technology and Development, Case Series No. 2.

The case history has been written to assist development planners, personnel of industrial research institutes, and USAID mission personnel in understanding the role that IRIs can and do play in the application of technology to development. It discusses efforts made by the Instituto de Investigaciones Tecnologicas (IIT) to reduce imports of wheat by substituting locally available flours, e.g., defatted soya and rice, particularly in breads and totally in pastas.

PB80-169782 PC **A03**/MF **A01**
Denver Research Inst., CO. Office of International Programs.
Thailand: Cassava Pelletizing Technology,
Ronald P. Black, Wanawan Peyayopanakul, and Sachee Piyapongse. Dec 79, 29p
Contract AID/ta-C-1337
Report on Industrial Research Institutes: Their Role in the Application of Appropriate Technology and Development, Case Series No. 1. See also PB80-154040.

The case history has been written to assist development planners, personnel of industrial research institutes, and USAID mission personnel in understanding the role that IRIs can and do play in the application of technology to development. It examines indigenous technology for producing cassava pellets as well as the related steps from the growing of the cassava through marketing the cassava pellets abroad.

PB80-170319 PC **A04**/MF **A01**
Centro de Investigaciones en Tecnologia de Alimentos, San Jose (Costa Rica).
Obtencion de un Frijol Precocido Mediante Extrusion (Obtention of Precooked Beans by Extrusion),
Jorge Zuniga, and Lyzette Henriguez Amestoy. 1979, 55p
Text in Spanish. Sponsored in part by Agency for International Development, Washington, DC.

The importance of the beans (Frijol) in the diet of Costa Rica is stressed and the advantages for the school cafeteria that will go with a precooked bean obtained through extrusion is explained. Steps for the process are listed in detail including costs of production, salaries, packing, and equipment for the whole program. Tables, conclusions, and recommendations are included.

PB80-171176 PC **A02**
Washington Univ., Seattle. Inst. for Food Science and Technology.
Supplemental Fish Protein as Milk Replacer for Animals,
Per O. Heggelund, and George M. Pigott. 1979, 4p WSG-TA-79-15, NOAA-80031002
Pub. in Transactions of the ASAE, v22 n5 p1226-1228 1979.

Biologically extracted supplemental fish protein, due to its high functionality and nutritive value, has a commercial application as a high protein food source, particularly as a milk replacer for animals. This paper reports results of an investigation modifying a peptic enzyme process, giving a product that meets the specifications for milk replacers.

PB80-176738 PC **A02**
Oregon State Univ., Newport. Marine Science Center.
Cooling Pacific Shrimp 'Pandalus jordani' with Refrigerated Seawater,
Edward Kolbe. c1979, 4p ORESU-R-79-015, NOAA-80032109
Grant NOAA-04-7-158-44085
Pub. in Jnl. of Food Science, v44 n5 p1418-1419, 1424 1979.

The study's objective was to describe how various factors affect on-board spray cooling of Pacific shrimp. Laboratory samples were sprayed with water to determine the variation of cooling rate with spray rate and depth of sample. Other experiments showed how flow patterns resulting from poorly distributed spray water varied with spray rate and with depth and density of the sample. Results of the study were used to conclude that a spray rate on the order of 0.4 gpm/sq ft is needed for typical high catch rate conditions. (Copyright (c) 1979, Institute of Food Technologists.)

PB80-927904 PC **E02**/MF **A01**
Central Intelligence Agency, Washington, DC.
Bleak Prospects for Meeting Kampuchean Food Needs.
Research paper.
Apr 80, 16p GC-80-10034
Paper copy also available on Standing Order, Deposit Account required. North American Continent price based on page count of individual documents; all others write for quote. This series offers a reduction in price as a Standing Order, PB80-927900.

In support of planning for UN conferences on Kampuchea, this report forecasts the magnitude of the food shortage confronting that country this year. It estimates the amount of food and seed rice the country will need, taking into consideration the likely effect of the dry season rice crop. Appendix A describes the methodology employed to derive the estimates. The estimates are, of necessity, based on assumptions concerning the size of the Kampuchean population, the caloric intake required to sustain the population, and rates of seeding, milling, and yield. The assumptions themselves are based on recent analyses, historical data, and statements broadcast by the Phnom Penh government. Tables containing alternative estimates based on differing assumptions are included in appendix B. Small changes in assumed values, however, will not significantly affect the basic conclusion that the Kampucheans will need a considerable amount of assistance if a recurrence of famine conditions is to be averted.

6J. Industrial (Occupational) Medicine

AD-A082 474/8 PC **A02**/MF **A01**
Dayton Univ OH Research Inst
Inter-Industry Noise Study: Another Look,
T. R. Schori, and Daniel L. Johnson. 1978, 7p UDR-TR-78-39, AMRL-TR-78-61
Contract F33615-78-C-0501
Pub. in Sound and Vibration, v13 n1 p16-21 Jan 79.

No abstract available.

PB80-167117 PC **A02**/MF **A01**
National Inst. for Occupational Safety and Health, Cincinnati, OH. Health Hazard and Technical Assistance Branch.
Health Hazard Evaluation Determination Report HE 78-111-588, Western Electric Company, Denver, Colorado.
Jan 80, 11p NIOSH-HE-78-111-588
Revision of report dated Apr 79.

Based on environmental and medical evidence, a hazard to the health of the workers exposed to Instapak urethane foam packaging system did not exist at the Western Electric Company in Denver, Colorado during the period of August 22-24, 1978. Medical questionnaires revealed a history of shortness of breath and perceived disagreeable odors associated with the foaming process in five of 21 respondents and perceptions of foul tastes in the mouth in four workers. Environmental air sampling indicated levels of both toluene diisocyanate (TDI) and diphenylmethane diisocyanate (MDI) below the limits of detection in seven area samples and nine personal samples. Small amount of tetrachloroethylene (perchloroethylene) and methyldicyclohexylamine were detected in the environmental samples below hygienically significant levels. The medical and environmental findings together suggest, but do not prove prior sensitization of workers to diisocyanates.

PB80-167125 PC **A02**/MF **A01**
National Inst. for Occupational Safety and Health, Cincinnati, OH. Health Hazard and Technical Assistance Branch.
Health Hazard Evaluation Determination Report 79-112-636, Stearns-Roger Fabricators, Inc., Denver, Colorado.
Dec 79, 11p NIOSH-79-112-636

Fifty eight breathing zone and general room air samples were taken on workers, at the Sterns-Roger Fabricators, Inc., Denver, Colorado, for manganese, iron oxide fume, fluoride, nickel, copper, chromium (VI), and chrome (metal). Concentrations of manganese, iron oxide, nickel, copper, and chrome (metal) were all well within the most recent evaluation criteria. An overexposure to fluoride existed in one of the five workers monitored for fluoride. Seven Cr+6 samples were taken in the general area and in the breathing zone of welders welding stainless steel. All levels were below the NIOSH laboratory limits of detection (.005 mg/sample). All workers were interviewed pre- and post-shift by a NIOSH medical team. Based on data collected, workers did not have medical problems. Based on industrial hygiene data, the only hazard existing at the time of this survey was one overexposure to fluoride.

PB80-167133 PC **A02**/MF **A01**
National Inst. for Occupational Safety and Health, Cincinnati, OH. Health Hazard and Technical Assistance Branch.
Health Hazard Evaluation Determination Report HE 79-136-668, Shoreham Nuclear Power Plant, Shoreham, Long Island, New York.
Feb 80, 6p NIOSH-79-136-668

NIOSH Investigators visited the construction site of the Shoreman Nuclear Power Plant, Shoreham, Island, New York, on October 18, 1979. They met with company and union (International Brotherhood of Electrical Workers) representatives, and conducted a walkthrough investigation. Three samples (two area and one personal) for airborne asbestos fibers were collected. Bulk samples, including a settled dust sample, for qualitative determination of asbestos were obtained. Laboratory

analysis confirmed that NOVATEX was chrysotile asbestos. Asbestos fibers were also detected in the settled dust sample (1-5% chrysotile). The two area samples were negative; however, the one personal sample (a pipefitter) was positive for asbestos (calculated exposure - 0.16 fibers per cubic centimeter of air). This level of exposure is in excess of the NIOSH recommended criteria of 0.1 fibers/cc.

PB80-167166 PC **A02/MF A01**
National Inst. for Occupational Safety and Health, Cincinnati, OH. Health Hazard and Technical Assistance Branch.
Health Hazard Evaluation Determination Report HE 80-6-667, Seiser and Wilpon, New York, New York.
Feb 80, 6p NIOSH-80-6-667

On October 15, 1979, the National Institute for Occupational Safety and Health (NIOSH) received a request from the firm of Seiser and Wilpon to determine if the Savin duplicating machine was generating harmful amounts of air contaminants. Personnel who worked in the office containing the duplicating machine had complained of occasional eye, nose and throat irritation during days when the machine was in operation. To evaluate the emissions given off by the duplicating machine, samples for organic solvents were collected on charcoal tubes an determinations found by analysis of the charcoal tubes. The only organic solvent found by analysis of the charcoal tubes was toluene. Only traces of ozone were found using the detector tubes. Even though the levels of toluene and ozone were found to be less than the environmental criteria, it is suggested that ventilation in the office area be improved.

PB80-167174 PC **A02/MF A01**
National Inst. for Occupational Safety and Health, Cincinnati, OH. Health Hazard and Technical Assistance Branch.
Hazard Evaluation and Technical Assistance Report TA 79-58, Montana State Department of Health, Pierce Packing Company, Billings, Montana.
Jan 80, 8p NIOSH-HE/TA-79-58
See also report dated Jun 79, PB80-153695.

On September 14, 1979, the National Institute for Occupational Safety and Health (NIOSH) and the Center for Disease Control (CDC) received a request to assist the Montana State Department of Health and Environmental Sciences in determining if any employees at the Pierce Packing Company, Billings, Montana, received a significant exposure to polychlorinated Biphenyl (PCB) after an accidental spill of PCB had occurred in June 1979. Sixteen exposed workers were interviewed and their skin was examined for chloracne; blood samples were drawn from the 16 exposed workers and 16 nonexposed workers and analyzed for PCB; a full-biochemical profile, including liver function tests and blood lipids was done on the 16 exposed workers. Air samples were collected to evaluate the present air concentration of PCB. The 16 exposed men (5 in the inedible department and 11 who worked there for short periods of time) showed no evidence of PCB poisoning by interview, skin examination and blood biochemical analysis. PCB air concentration showed no inhalation hazard existed at the time of sampling which was approximately 3 months after the spill. The blood tests did not reveal evidence of PCB related disease.

PB80-167182 PC **A02/MF A01**
National Inst. for Occupational Safety and Health, Cincinnati, OH. Health Hazard and Technical Assistance Branch.
Health Hazard Evaluation Determination Report HE 79-78-655, Bertoia Studio, Bally, Pennsylvania.
Jan 80, 11p NIOSH-HE-79-78-655

A health hazard evaluation of the Bertoia Studio art work and wind system production areas was conducted during the periods of May 10, June 20, and August 1, 1979. NIOSH Regional (III) Industrial Hygienist, Frank A. Lewis, carried out a comprehensive walk-through indirect medical questionnaire interviews and environmental sampling to determine possible employee exposures to beryllium dust, cadium fumes, and fluorides (soluble). It is the judgement of this industrial hygienist that the workers were not exposed to potentially toxic centrations of the aforementioned toxic materials. In fact, all of the air samples taken were below the reliable analytical limit of detection for each of the substances.

PB80-168164 CP **T02**
Bureau of Labor Statistics, Washington, DC. Office of Occupational Safety and Health Statistics.
Supplementary Data System, Microdata File, South Dakota, 1978.
Data file,
Norman Root, and Ethel T. Crawford. 1978, mag tape BLS/DF-80/019
Source tape is in EBCDIC character set. Tapes can be prepared in most standard 7 or 9 track recording modes for one-half inch tape. Identify recording mode desired by specifying character set, track, density, and parity. Call NTIS Computer Products if you have questions.

Tape contains records of individual occupational injuries and illnesses. Selected injury and illness factors were classified in accordance with standard definitions used in the Supplementary Data System of the Bureau of Labor Statistics. Each case record contains year, month and day of occurrence; nature of injury or illness, part of body affected, type of accident or exposure, and source of injury or illness; occupation, industry, age, sex, and length of service of injured or ill employee. Technical documentation is available: PB80-149982, Supplementary Data System, Microdata Files, User's Guide, 1978-79. Data were compiled by the South Dakota State Department of Health from records of workers' compensation cases which occurred during 1978. Data include cases arising in public employments except for elected or appointed State, county, or local officials; and in private employments with these principal exceptions: Certain farm workers, domestic servants, and casual workers unless covered voluntarily; persons whose employment is not in the usual course of the trade, business, occupation, or profession of the employer; and executive officers of nonprofit corporations. Workers' compensation coverage is voluntary for the preceding categories. In addition, Federal, railroad and maritime employments are not covered by the State act and cases involving such employees are not included in these data.

PB80-168826 PC **A02/MF A01**
National Inst. for Occupational Safety and Health, Cincinnati, OH. Health Hazard and Technical Assistance Branch.
Health Hazard Evaluation Determination Report HE 79-120-662, Rocky Mountain Radiator, Boulder, Colorado.
Feb 80, 9p NIOSH-HE-79-120-662

In July 1979, the National Institute for Occupational Safety and Health (NIOSH) received a request to evaluate occupational exposures to lead (Pb) at the Rocky Mountain Radiator, Boulder, Colorado. A limited physical examination and a medical questionnaire directed towards potential sources of lead exposure were completed on all three workers. Venous blood samples were obtained for whole blood lead analysis. The three workers had lead levels of 25, 41, and 52 micrograms of lead per 100 grams of whole blood (microgram Pb/100 g). All three were monitored for breathing zone air levels of lead. General room air samples for lead analysis were also obtained. Four (4) of six (6) air samples exceeded the Occupational Safety and Health Administration (OSHA) standard of 0.05 mg/cu m. On the basis of environmental and medical data, a potential health hazard existed from overexposure to lead.

PB80-169063 PC **A02/MF A01**
National Inst. for Occupational Safety and Health, Cincinnati, OH. Health Hazard and Technical Assistance Branch.
Health Hazard Evaluation Determination Report HE 80-7-661, Jan Clopton Composition, Atlanta, Georgia.
Feb 80, 8p NIOSH-HE-80-7-661

NIOSH conducted an environmental evaluation of the Jan Clopton Composition Co., Atlanta, Georgia. Air quality in the typesetting area was checked using direct reading detector tubes. Samples of air discharged from typesetting and photographic equipment were collected on organic vapor adsorbing charcoal tubes and submitted to the NIOSH laboratory for analysis. Measureable quantities of aldehydes, sulfur dioxide, and ozone were not found using detector tubes. Carbon monoxide was detected at a level of 5 parts per million (PPM), which is well below the NIOSH recommended limit of 35 ppm. Laboratory analysis of the air samples collected from typesetting and photographic equipment found trace amounts of 1,1,1-trichloroethane (methyl chloroform) and low molecular-weight aliphatic hydrocarbons (C6 to C10) alkanes. Exposure to these substances at the levels detected were not considered hazardous.

PB80-169089 PC **A02/MF A01**
National Inst. for Occupational Safety and Health, Cincinnati, OH. Health Hazard and Technical Assistance Branch.
Health Hazard Evaluation Determination Report HE-79-43-663, Harbison-Walker Refractories, Clearfield, Pennsylvania.
Feb 80, 13p NIOSH-HE-79-43-663

On December 19, 1978 NIOSH received a request from the United Steel Workers of America to evaluate creosote exposures of mixers and laborers at the Harbison-Walker Refractories No. 1 Plant, Clearfield, Pennsylvania. The visit to the Plant was delayed until June 27, 1979, due to the fact that this operation is sporadic and no production using creosote was performed until that time. Eight employees were questioned about adverse health effects they may have as a result of their exposure to coal tar creosote. The results of the atmospheric sampling performed on September 26-27, 1979 showed that employee exposures to coal tar pitch volatiles (benzene soluble fraction) ranged from 0.03 to 1.42 milligram per cubic meter of air and exceeded OSHA, American Conference of Governmental Industrial Hygienists (ACGIH), and NIOSH criteria for coal tar pitch volatiles. NIOSH and ACGIH recognize that polycyclic aromatic hydrocarbons, which were also detected in the personal air samples, have carcinogenic or co-carcinogenic potential. NIOSH recommends that exposure should be controlled to the lowest reliable analytical detection level.

PB80-169097 PC **A02/MF A01**
National Inst. for Occupational Safety and Health, Cincinnati, OH. Health Hazard and Technical Assistance Branch.
Health Hazard Evaluation Determination Report HE 79-51-664, Gates Energy Products, Inc., Denver, Colorado.
Feb 80, 12p NIOSH-HE-79-51-664

An environmental and biological survey was conducted on March 13-15, 1979, to evaluate potential overexposures at the Gates Energy Products Co. Breathing zone air samples were taken on workers in all areas for lead determination. Methyl chloroform samples were taken in one area where perforated lead sheets were cleaned with methyl chloroform. Blood samples were taken on 217 workers, and a brief work history questionnaire given to each one. Fifty-four percent of the lead air samples taken exceeded the Occupational Safety and Health Administration (OSHA) standard of 0.05 mg/cu M. None of the methyl chloroform samples exceeded the 1979 ACGIH Threshold Limit Value (TLV) of 1900 mg/cu M. Lead was analyzed in 217 blood samples. Forty-four percent of these samples exceeded the OSHA standard of 40 micrograms Pb/100 grams of whole blood (40 micrograms Pb/100 g). Thirty-seven percent were between 40-60 micrograms Pb/100 grams of whole blood. Six percent were between 60-80 micrograms Pb/100 grams of whole blood and one percent exceeded 80 micrograms Pb/100 grams of whole blood. On the basis of these environmental and medical data, it was concluded that a health hazard existed from overexposure to lead.

PB80-169790 PC **A02/MF A01**
National Inst. for Occupational Safety and Health, Cincinnati, OH. Health Hazard and Technical Assistance Branch.
Health Hazard Evaluation Determination Report 79-130-645, Craig Power Plant, Craig, Colorado.
Dec 79, 7p NIOSH-HE-79-130-645

A health hazard evaluation was conducted by the National Institute for Occupational Safety and Health (NIOSH) at the Craig Power Plant, Craig, Colorado, on September 26, 1979. Breathing zone air samples were taken for acetone, styrene, and 2-butanone (methyl ethyl ketone/MEK). Airborne concentrations of these contaminants were not detected by the sampling/analytical methods used; however, the odors characteristic of these were easily observed at the time of this survey. All workers were interviewed. The interviews were directed towards exposures to acetone, MEK, and styrene. At the time of this evaluation several of the workers, as well as NIOSH investigators, reported complaints such as narcosis burning eyes, and upper respiratory tract irritation. Based on employee interviews, a potential health hazard exists even though all air samples taken during this survey were below laboratory detection limits.

PB80-169808 PC **A02**/MF **A01**
National Inst. for Occupational Safety and Health, Cincinnati, OH. Health Hazard and Technical Assistance Branch.
Health Hazard Evaluation Determination Report HE 79-134-638, Historic Atlanta Local Development Company, Atlanta, Georgia.
Dec 79, 8p NIOSH-HE-79-134-638

The National Institute for Occupational Safety and Health (NIOSH) conducted a health hazard evaluation in the office of the Historic Atlanta Local Development Company (HALDC) located in the Old Atlanta Railroad Freight Depot, Atlanta, Georgia. An initial survey was completed August 20, 1979, and two follow-up visits were made September 27 and October 21, 1979. Based on the results of these investigations it has been determined that the symptoms reported by the HALDC employees (eye, nasal, throat irritation, and headaches) may have been caused by a defective refrigerator. Some of the rubber insulation on a section of the refrigerant line had previously been burned and damaged from an unknown heat source. The refrigerant used in this system was sulfur dioxide (SO_2), an irritant gas which is capable of causing eye, nose, and throat irritation, and sometimes choking followed by nasal discharge, sneezing, coughing, and increased mucous secretions. No complaints or symptoms were noted after August 31, 1979. At the request of the NIOSH investigator, the refrigerator was removed from the office on September 28, 1979.

PB80-169816 PC **A02**/MF **A01**
National Inst. for Occupational Safety and Health, Cincinnati, OH. Health Hazard and Technical Assistance Branch.
Health Hazard Evaluation Determination Report No. 79-127-644, Digital Equipment Corporation, Colorado Springs, Colorado.
Dec 79, 7p NIOSH-HE-79-127-644

A health hazard evaluation was conducted by the National Institute for Occupational Safety and Health (NIOSH) at the Digital Equipment Corporation, Colorado Springs, Colorado, on August 28, 1979. Breathing zone and general room air samples were taken for 1,1,2-trichloro 1,2,2-trifluoroethane (Freon-113r). Environmental concentrations were less than 15 percent of the evaluation criteria of 7600 mg/cu M. All workers were interviewed. The interviews were directed towards possible effects of exposure to Freon-113, phosgene, and carbonyl fluoride exposures. At the time of this evaluation none of the workers reported any symptoms. Several said they were sick previously but had not had a reoccurrence in over a month. Based on employee interviews and the low levels of Freon-113, a health hazard did not exist at the time of this evaluation.

PB80-169824 PC **A02**/MF **A01**
National Inst. for Occupational Safety and Health, Cincinnati, OH. Health Hazard and Technical Assistance Branch.
Health Hazard Evaluation Determination Report 79-106-635, Beth Israel Hospital Laboratory, Denver, Colorado.
Dec 79, 8p NIOSH-HE-79-106-635

A health hazard evaluation was conducted by the National Institute for Occupational Safety and Health (NIOSH) at Beth Israel Hospital Laboratory, Denver, Colorado, on June 14, 1979. At the time of this evaluation breathing zone and general room air samples were taken on workers for ethanol, formaldehyde, toluene, and xylene. A health hazard did not exist at this facility during the time of this evaluation. This laboratory has adequate ventilation that is used correctly by all workers.

PB80-169832 PC **A02**/MF **A01**
National Inst. for Occupational Safety and Health, Cincinnati, OH. Health Hazard and Technical Assistance Branch.
Health Hazard Evaluation Determination Report HE 78-81-658, Teltronic Systems, Inc., New York.
Jan 80, 10p NIOSH-HE-78-81-658

A Health Hazard Evaluation was conducted by the National Institute for Occupational Safety and Health (NIOSH) at the office of Teltronic System, Inc. to determine if compounds released during the operation of a copying machine might contribute to complaints of headaches and sore throats. Direct reading instrumentation was unable to detect the presence of ozone. Small quantities of methyl alcohol, toluene, and carbon monoxide were found to be present in the office. Although the concentrations of these contaminants are within acceptable limits, recommendations are made to limit exposure because of the coincidence of symptoms with the operation of the copying machine.

PB80-169857 PC **A02**/MF **A01**
National Inst. for Occupational Safety and Health, Cincinnati, OH. Health Hazard and Technical Assistance Branch.
Health Hazard Evaluation Determination Report HE 78-7-666, Kawecki Berylco Industries, Inc., Boyertown, Pennsylvania.
Feb 80, 23p NIOSH-HE-78-7-666

At the request of Locals 619 and 959 of the International Chemical Workers Union, The National Institute for Occupational Safety and Health (NIOSH) conducted a health hazard evaluation at the Kawecki Berylco Industries, Inc., in Boyertown, Pennsylvania. In January and February of 1978, and again in April of 1979. The purpose of the visits was to evaluate the basis for complaints by the titanium diboride process workers over possible health effects from exposure to carbon black, especially the possibility that the carbon black might contain polynuclear aeromatic carcinogens. The on-site investigation took place in two phases: the initial investigation in January and February of 1978, and a follow-up visit in April of 1979. The follow-visit was necessitated by changes in the size, methods, and number of workers involved in the process being investigated, as well as changes in the NIOSH criteria for determining hazardous exposure to carbon black. Confidential medical interviews were conducted and bulk, area, and personal breathing zone samples were collected and analyzed. Carbon black in use, both during the initial and follow-up visits, was found to contain well above 0.1 percent cyclohexane -extractable fraction, the level required to be classified as PNA contaminated carbon-black.

PB80-170137 PC **A05**/MF **A01**
Conservation Foundation, Washington, DC.
Sensitive Populations and Environmental Standards (A Legal Analysis),
Robert D. Friedman. Oct 79, 87p

The report examines the manner in which the Clean Air Act and the Occupational Safety and Health Act can be construed, from a legal point of view, to require protection of people who are specially at risk. The notion that some people are specially at risk derives from the fact that the human population is heterogeneous in many ways--that genetic inheritance and life experiences differentiate each individual from the rest and some groups of people from others. Groups of people, so-called sensitive populations, share one or more identifiable characteristics, and, indeed, could not be identified as members of a group if this were not the case.

PB80-170210 Not available NTIS
National Bureau of Standards, Washington, DC.
NBS Conducts Study for OSHA, Requests Information from Public.
Final rept.,
H. L. Steinberg. Feb 76, 1p
Pub. in Occup. Saf. Health Rep. 5, n39 p1278 Feb 76.

This article is, basically, a request for data on accidents in which the use, or misuse, of fall-restraint or fall-arrest equipment played a significant role. 'Fall-restraint/fall-arrest equipment' is taken to include: safety (body) belts, lanyards, drop lines, safety lines, life lines, linemen's belts, body and chest harnesses, rope-grabbing and shock absorbing devices and associated hardware. 'Accidents' are defined to include 'near misses' (i.e., mishaps where no losttime injury occurred). The motivation for this request is briefly explained for the purpose of enhancing response probability.

PB80-174790 PC **A02**/MF **A01**
National Inst. for Occupational Safety and Health, Cincinnati, OH. Health Hazard and Technical Assistance Branch.
Health Hazard Evaluation Determination Report HE 79-100-665, L. R. I. Industries, Chelsea, Michigan.
Feb 80, 14p NIOSH-HE-79-100-665

On June 10 and August 16, 1979, the National Institute for Occupational Safety and Health (NIOSH) conducted an environmental evaluation at L.R.I. Industries, a maker of ceramic tubling media, in Chelsea, Michigan, to evaluate possible hazards from noise, from dusts containing free silica, and from asbestos. Environmental measurements were made for airborne particulates containing free silica. Bulk samples of batch ingredients were obtained for asbestos and other analyses. One noise dosimeter reading plus five noise level readings at ear level using the dBA slow response scale were taken. Informal interviews were conducted with employees regarding work histories and work conditions. The chief complaint from most employees were the poor condition and location of eating areas.

PB80-176332 PC **A02**/MF **A01**
National Inst. for Occupational Safety and Health, Rockville, MD.
Radiofrequency (RF) Sealers and Heaters: Potential Health Hazards and Their Prevention.
Current intelligence bulletin 33.
4 Dec 79, 23p NIOSH/OSHA-80-107
Sponsored in part by Occupational Safety and Health Administration, Washington, DC.

The National Institute for Occupational Safety and Health (NIOSH) and the Occupational Safety and Health Administration (OSHA) are concerned about potential health hazards to workers exposed to radiofrequency (RF) energy emitted from RF dielectric heaters (more widely known as RF sealers and heaters). RF energy is nonionizing electromagnetic radiation and should not be confused with X-rays and other ionizing radiation. RF energy, when absorbed in sufficient amounts by workers, may produce adverse thermal effects resulting from heating of deep body tissue which may include potentially damaging alterations in cells. Absorption of RF energy may also result in 'nonthermal' effects on cells or tissue, which may occur without a measureable increase in tissue or body temperature. 'Nonthermal' effects have been reported to occur at exposure levels lower than those that cause thermal effects. While scientists are not in complete agreement regarding the significance of reports of 'nonthermal' effects observed in laboratory animals, NIOSH believes there is sufficent evidence of such effects to cause concern about human exposures.

PB80-176340 PC **A15**/MF **A01**
PEDCo-Environmental, Inc., Cincinnati, OH.
Industrial Hygiene Characterization of the Photovoltaic Solar Cell Industry.
Technical rept.,
Terry M. Briggs, and Timothy W. Owens. Mar 80, 345p DHEW/PUB/NIOSH-80-112
Contract PHS-NIOSH-210-78-0059
Prepared in cooperation with Occusafe, Inc., Wilmette, IL.

The information presented in this report is based on a comprehensive literature review and walk-through surveys of 14 production or research and development facilities. The investigation covers the technology from base material preparation

through final module assembly. Descriptions are given of major technologies under development and the associated chemical and physical agents to which workers could be exposed. Indepth sampling surveys were conducted. Industrial hygiene concerns connected with each major technology are presented. Available health effects literature is listed for the chemicals used in all reviewed technologies.

SAND-80-0068 PC **A02**/MF **A01**
Sandia Labs., Albuquerque, NM.
Special Projects Division Quarterly Report of Progress, 1 October-31 December 1979.
Jan 80, 20p
Contract EY-76-C-04-0789

Audit/Appraisal Guidelines for Organizational ES and H Assurance Programs, SAND79-1812, was published this quarter. The quidelines presented in this document are designed to provide a means for efficient evaluation of Environment, Safety, and Health (ES and H) assurance programs that are conducted on the basis of An Environment, Safety, and Health Assurance Program Standard, SAND79-1536, published last quarter. Preliminary versions of model ES and H plans for institutions and line organizations were completed. A comprehensive briefing on the efforts of the Special Projects Division over the last 2 years to develop and test an ES and H Assurance Program was prepared. The briefing given to representatives of 12 of the nation's largest corporations has resulted in uniformly positive feedback. Efforts to compare the characteristics of ES and H programs based on SAND79-1536, An Environment, Safety, and Health Assurance Program Standard, with program characteristics implied in recommendations by the President's Commission on the Accident at Three Mile Island have begun. Initial results appear to indicate that use of the program standard at the operating level would lead to a program that addresses all of the commission's general recommendations dealing with industry. In addition, such use would appear to be consistent with the commission's charge that the regulatory agency's primary statutory mission and first operating priority must be the assurance of safety and lead to a regulatory program consistent with recommendations supporting this mandate. (ERA citation 05:014442)

UCRL-82656 PC **A02**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Health and Research Organization to Meet Complex Needs of Developing Energy Technologies.
R. V. Griffith. 1980, 7p CONF-800304-4
Contract W-7405-ENG-48
International congress of the International Radiation Protection Association, Jerusalem, Israel, 8 Mar 1980.

At the Lawrence Livermore Laboratory, a unique safety technology organization has been established that is especially geared to respond to interdisciplinary health and safety questions in response to rapidly growing energy technology problems. This concept can be adopted by smaller organizations at a more modest cost, and still maintains the efficiency, flexibility, and technical rigor that are needed more and more in support of any industry health and safety problem. The separation of the technology development role from the operation safety organization allows the operational safety specialists to spend more time upgrading the occupational health and safety program but yet provides the opportunity for interchange with health and safety technology development specialists. In fact, a personnel assignment flow between an operational health and safety organization and a special technology development organization provides a mechanism for upgrading the overall safety capability and program provided by a given industrial or major laboratory. (ERA citation 05:012689)

UCRL-83231(Rev.1) PC **A02**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Multidisciplinary Training Program to Create New Breed of Radiation Monitor: The Health and Safety Technician.
W. F. Vance. 22 Oct 79, 10p CONF-791203-8(Rev.1)
Contract W-7405-ENG-48
Health Physics Society meeting, Honolulu, HI, USA, 10 Dec 1979.

A multidiscipline training program established to create a new monitor, theHealth and Safety Technician, is described. The training program includes instruction in fire safety, explosives safety, industrial hygiene, industrial safety, health physics, and general safety practices. (ERA citation 05:007704)

6K. Life Support

AD-A082 910/1 Not available NTIS
Defence and Civil Inst of Environmental Medicine Downsview (Ontario)
Survival Test of Submersible Life Support Systems,
L. A. Kuehn, K. N. Ackles, and J. D. Cole. 1977, 7p Rept no. DCIEM-PUB-76X60
Availability: Pub. in Aviation, Space, and Environmental Medicine, v48 n4 p332-338 Apr 77 (No copies furnished by DTIC).

No abstract available.

PB80-174667 PC **A02**
California Univ., San Diego, La Jolla. Dept. of Medicine.
New Techniques in Closed-Chest Cardiac Compressions: Aquatic CPR.
1980, 9p NOAA-80031105
Grant NOAA-04-8-M01-189
Pub. in Proceedings of Annual International Diving Symposium (10th), held at New Orleans, LA, on Feb 4-6, 1980.

More than 8,000 drownings occur annually in the United States alone. With the increasing popularity of SCUBA diving for commercial, industrial and sport purposes, one can predict an increase in related deaths and accidents. Regrettably, procedures to administer emergency aid are limited to mouth-to-mouth; while cardiopulmonary resuscitation (CPR) must await the victim being moved to a firm surface. This study discusses the technique of placing the victim upon the rescuer's chest and initiating full CPR immediately on the site. Ventilations are administered using a safety-designed modified SCUBA regulator (Emergency Regulator Resuscitation). The techniques were tested on an instrumented aquatic CPR mannequin, and were within the published criteria for successful CPR.

PB80-174675 PC **A02**
California Univ., San Diego, La Jolla. Dept. of Medicine.
SCUBA for IPPB (Intermittent Positive Pressure Breathing),
Nico F. March, and Ric Matthews. Feb 80, 9p
NOAA-80031104
Grant NOAA-04-8-M01-1189
Pub. in Proceedings of Annual International Diving Symposium (10th), held at New Orleans, LA, on Feb 4-6, 1980.

Preliminary studies have been conducted to determine the feasibility of administering emergency airway ventilation utilizing a safety-designed, factory-calibrated SCUBA regulator. These regulators are pressure limited to deliver 40 mm Hg peak inspiratory pressure at the mouthpiece. This pressure is obtained only upon complete depression of the purge mechanism. Maximum inspiratory pressures are in accordance with criteria set forth by the American Medical Association, Standards for Cardiopulmonary Resuscitation and Emergency Cardiac Care. Preliminary results from experiments conducted on dogs indicate that these SCUBA regulators may reverse hypercarbia, arterial hypoxemia, and acidosis resulting from drowning, seawater aspiration or other respiratory dysfunctions. In humans this is possible without occluding the nose or completely sealing the mouth, due to the high flow regulator.

6L. Medical and Hospital Equipment

AD-A082 493/8 PC **A02**/MF **A01**
Aerospace Medical Research Lab Wright-Patterson AFB OH
Autoclavable Dispensing Device.
Technical rept. May-Sep 79,
Ronald D'Allessandris, and Fredrick Hively. Feb 80, 8p Rept no. AMRL-TR-79-97

This device described has proved to be of great value in our laboratory. The savings in time expended not only on addition of the glucose but also in the re-doing of contaminated bottles has been significant. (Author)

PB80-167463 PC **A15**/MF **A01**
Utah Univ., Salt Lake City. Inst. for Biomedical Engineering.
Development of a Reversing Electrohydraulic Energy Converter for Left Ventricular Assist Devices.
Annual rept. Oct 78-Jan 80,
R. K. Jarvik. Jan 80, 335p NIH-N01-HV-7-2975-2
Contract N01-HV-7-2975

Following demonstration of feasibility, a complete LVAS system utilizing the Jarvik-7 ventricle, reversing electrohydraulic energy converter, reservoir chamber, Nutech motor commutator, Utah physiologic controller, and battery power supply, is under development. Principal emphasis to date has involved energy converter component development, energy converter design, fabrication, and testing, and development of a computerized data acquisition and analysis system. Achievements include: energy converter volume = 30 cc, weight = 90 gm; peak efficiency >20%; peak motor efficiency >80%; peak axial flow pump efficiency >75%; hydraulic flow greator than or less than 12 1/min approximately 120 beats/min, 120 mm Hg mean systolic axial flow pump differential pressure; blood pump flow greater than or less than 10 1/min approximately 120 beats/min, 100 mm Hg AoP, 15 mm Hg F.P.; implantable LVAS system <400 cc, <400 gm (energy converter, blood pump, hydraulic fluid, and reservoir chamber); and special retainerless ball bearings with a high life expectancy have been obtained. Accelerated and real time durability testing will be initiated soon and animal implants are scheduled to begin in June, 1980.

PB80-170509 PC **A07**/MF **A01**
Andros, Inc., Berkeley, CA.
Development of a Dual Pusher-Plate Blood Pump for a Clinical Left Ventricular Assist System.
Annual rept. 15 Sep 77-14 May 78,
Peer M. Portner, Jal S. Jassawalla, Herbert Chen, Michael G. Conley, and Phillip J. Miller.
Jun 78, 144p NIH-N01-HV-7-2938-1
Contract N01-HV-7-2938

A novel, dual pusher-plate sac blood pump is being designed from first principles to be integrated with a solenoid energy converter, resulting in a systems-designed clinical Left Ventricular Assist System (LVAS). The basic pump concept utilizes a smooth, seamless polyurethane sac directly actuated by a pair of symmetrically opposed pusher plates. The pump is circular, with tangential inflow and outflow conduits for smooth, even washing of the entire blood contacting surface. The dual pusher plates result in reduced sac deformation and stresses and symmetrical flow patterns. Development focus has been on: (1) design and analysis of the Model I pump (including computer modeling of pump deformation and stresses), (2) construction of a pump fabrication facility, (3) development of pump fabrication techniques, and (4) in vitro testing and evaluation.

UCID-18225 PC **A03**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Development and Evaluation of New Stains and Other Optical Markers Useful for Cytopathologic Specimens In Suspension. Tenth Semi-Annual Progress Report, 1 December 1978-30 June 1979.
B. H. Mayall, E. B. King, R. H. Jensen, and P. N. Dean. 25 Jul 79, 28p
Contract W-7405-ENG-48

The major part of our effort during this past reporting period has been engineering design, assembly, and testing of the Dual Beam, Computer Controlled Sorter. At the same time, double DNA staining and single DNA staining have continued to be studied. Specific achievements during the reporting period are: Redesign of the signal handling

electronics in the DBS; Assembly of the redesigned electronics and installation into the DBS; Completion of the firmware installation of the ND-6660 for computer-controlled sorting; Addition of a video display to the LSI-11 sorter monitor; Three parameter analysis of cervical samples measuring log (chromomycin A3 fluorescence), log (orthogonal light scatter), log (Hoechst 33258 fluorescence); Three parameter analysis of cervical samples measuring log (chromomycin A3 fluorescence), log (orthogonal light scatter), log (SITS fluorescence); Analysis of the effect of DNase pretreatment on diagnostic power of flow cytometry measuring log (chromomycin A3 fluorescence) and log (orthogonal light scatter); Analysis of the diagnostic power of such flow cytometry on samples pooled separately from the ectocervix-endocervix and the vagina. (ERA citation 05:014273)

UCLA-12-1232 PC **A03**/MF **A01**
California Univ., Los Angeles. Lab. of Nuclear Medicine and Radiation Biology.
Positron Emission Tomography of the Heart.
H. R. Schelbert, M. E. Phelps, and D. E. Kuhl.
1979, 34p
Contract EY-76-C-03-0012

Positron emission computed tomography (PCT) represents an important new tool for the noninvasive evaluation and, more importantly, quantification of myocardial performance. Most currently available techniques permit assessment of only one aspect of cardiac function, i.e., myocardial perfusion by gamma scintillation camera imaging with Thallium-201 or left ventricular function by echocardiography or radionuclide angiocardiography. With PCT it may become possible to study all three major segments of myocardial performance, i.e., regional blood flow, mechanical function and, most importantly, myocardial metabolism. Each of these segments can either be evaluated separately or in combination. This report briefly describes the principles and technological advantages of the imaging device, reviews currently available radioactive tracers and how they can be employed for the assessment of flow, function and metabolism; and, lastly, discusses possible applications of PCT for the study of cardiac physiology or its potential role in the diagnosis of cardiac disease. (ERA citation 05:012589)

6M. Microbiology:

AD-A082 626/3 PC **A03**/MF **A01**
Rochester Univ NY Dept of Microbiology
The Physiological Bases for Microbial Barotolerance.
Annual rept. 1 Apr 79-31 Mar 80,
Robert E. Marquis. 31 Mar 80, 39p Rept no. TR-8
Contract N00014-75-C-0634

Work has focused on two main topics: the characterization of microbial growth inhibition by compressed gases and liquid anesthetics, and the effects of hydrostatic pressure on microorganisms. The work has involved both prokaryotic and eukaryotic microorganisms, and for the first time, we have started to use mammalian, tissue-culture cells. It was previously concluded that growth modification by compressed gases and other anesthetics is not due to narcotic action but to a definably different class of actions. The results of experiments carried out this year have indicated clearly that helium pressure is not equivalent to hydrostatic pressure and that helium has specific biological effects. In fact, a specific inhibitory action of helium for an isolated enzyme, xanthine oxidase, was demonstrated. Hydrostatic pressure was found to have little effect on oxygen toxicity for yeast or bacteria, whereas helium (or nitrogen or argon) were potentiating. Again, helium seems to have specific biological actions, and compressed helium should not be used as a convenient means to apply hydrostatic pressure to microbial cells. The narcotic antagonists naloxone and levallorphan do not reverse the growth inhibition due to nitrous oxide or heptanol.

AD-A082 861/6 Not available NTIS
Materials Research Labs Ascot Vale (Australia)
Microbial Attack on Materials,
F. John Upsher. 1976, 4p
Availability: Pub. in Proceedings Royal Australian Chemical Inst., p173-176 Jun 76 (No copies furnished by DTIC).

No abstract available.

BNL-26964 PC **A02**/MF **A01**
Brookhaven National Lab., Upton, NY.
Chlorophyll, Bacteriochlorophyll, or Protochlorophyll.
J. M. Olson. 1978, 8p
Contract EY-76-C-02-0016

The question of which chlorophyll came first in the evolution of photosynthesis is discussed. It has been assumed that bacteriochlorophyll a came first, because the earliest photosynthetic organisms are thought to have been obligatory anaerobes. The writer proposes that the common ancestor of all photosynthetic prokaryotes and organelles contained protochlorophyll a, and that all green and purple photosynthetic bacteria are descended from a bacteriochlorophyll a - containing ancestor which diverged from the chlorophyll a line leading to blue-green algae and chloroplasts. (ERA citation 05:012582)

COO-2311-30 PC **A02**/MF **A01**
Pennsylvania State Univ., University Park. Coll. of Science.
Membrane-Membrane Interactions in a Lipid-Containing Bacteriophage System. Progress Report, October 1, 1978-September 30, 1979.
W. Snipes. Jun 79, 6p
Contract EY-76-S-02-2311

Progress is reported on research on two aspects of the life cycle of PM2, a lipid-containing bacteriophage. The first concerns the initial interaction of PM2 with the outer membrane of its host cell, Pseudomonas BAL-31. The second concerns the assembly of PM2 in infected cells and the structural features of hydrophobic membrane perturbers that inhibit PM2 assembly. Several other projects have been completed: distribution of PM2 receptors; effects of adamantance derivatives on PM2 production; hydrophobic membrane perturbers as antiviral and virucidal agents; hydrophobic photosensitizers; and other technique development. (ERA citation 05:012583)

COO-4198-9 PC **A09**/MF **A01**
Massachusetts Inst. of Tech., Cambridge. Dept. of Nutrition and Food Science.
Degradation of Cellulosic Biomass and Its Subsequent Utilization for the Production of Chemical Feedstocks. Progress Report, December 1, 1978-February 28, 1979.
D. I. C. Wang, C. L. Cooney, A. L. Demain, R. F. Gomez, and A. J. Sinskey. Feb 79, 176p
Contract EG-77-S-02-4198

The ongoing progress of a coordinated research program aimed at optimizing the biodegradation of cellulosic biomass to ethanol and chemical feedstocks is summarized. Growth requirements and genetic manipulations of clostridium thermocellum for selection of high cellulose producers are reported. The enzymatic activity of the cellulase produced by these organisms was studied. The soluble sugars produced from hydrolysis were analyzed. Increasing the tolerance of C. thermocellum to ethanol during liquid fuel production, increasing the rate of product formation, and directing the catabolism to selectively achieve high ethanol concentrations with respect to other products were studied. Alternative substrates for C. thermocellum were evaluated. Studies on the utilization of xylose were performed. Single stage fermentation of cellulose using mixed cultures of C. thermocellum and C. thermosaccharolyticum were studied. The study of the production of chemical feedstocks focused on acrylic acid, acetone/butanol, acetic acid, and lactic acid. (ERA citation 05:012584)

PB80-165582 PC **A02**/MF **A01**
North Carolina Univ. at Chapel Hill. School of Medicine.
Surveillance for Influenza and Other Respiratory Viruses.
Final rept. Jul 78-Jun 79,
Floyd W. Denny. Jul 79, 12p DAB-VDP-07-117
Contract N01-AI-2-2505

Cultural surveillance for influenza virus infections in children was initiated in Chapel Hill, NC in May 1976, under contract with the NIAID. The study terminated at the request of NIAID in June 1979. During the observation period, two major influenza outbreaks were monitored: one due to B/HK/5/72-like viruses in January-February 1977, and one caused by A/Brazil/78 (H1N1)-like viruses in 1979. During the 1977-1978 season 12 influenza A/Texas/77 (H3H2) isolates were recovered primarily in January 1978, while four influenza A/USSR/77 (H1N1) isolations were made in February and March 1977. This report will describe an A/Brazil (H1N1) outbreak which occurred in January-February 1979.

PB80-174659 PC **A02**
Texas A and M Univ., College Station. Food Quality and Safety Lab.
Effects of Sampling Procedures on 'Salmonella' Recovery from Fresh Water Catfish,
Lawrence E. Wyatt, Ranzell Nickelson, II, and Carl Vanderzant. cJan 80, 6p TAMU-SG-80-810, NOAA-80031202
Grant NOAA-04-7-158-44105
Pub. in Jnl. of Food Protection, v43 n1 p44-45 Jan 80.

To determine the effectiveness of different sampling procedures, 200 frozen catfish known to be contaminated with Salmonella were divided into 350 samples. Variables in sampling included anterior and posterior portions of fish, blending, immersion, swabbing, rinsing and incubation at elevated temperatures. The composite of blended anterior and posterior samples incubated at 43 C and immersion of whole fish incubated at 35C showed the highest number of positive samples, 50% and 42%, respectively. The contact method of swabbing (14%) and rinsing (14%) were the least effective of the methods examined. The anterior (visceral cavity area) portions of the fish seemed to be more highly contaminated (38% positive) than the posterior portion (26% positive). These data show that the sampling procedure can greatly affect recovery of Salmonella from fresh water catfish. Overall levels of Salmonella were low and the hazards of cross-contamination with other foods seem remote.

6O. Pharmacology

AD-A082 646/1 PC **A02**/MF **A01**
Walter Reed Army Inst of Research Washington DC
In vivo Effects of Apomorphine and 4-(3-Butoxy-4-Methoxybenzyl)-2-Imidazolidinone (RO 20-1724) on Cyclic Nucleotides in Rat Brain and Pituitary,
G. Jean Kant, James L. Meyerhoff, and Robert H. Lenox. 21 May 79, 7p
Pub. in Biochemical Pharmacology, v29 p369-373 1980.

No abstract available.

AD-A082 702/2 Not available NTIS
Flying Personnel Research Committee London (England)
Behavioural Sequelae of Methaqualone in Man and in the Monkey (Macaca mulatta),
R. G. Borland, A. N. Nicholson, and Catherine M. Wright. 27 Sep 74, 14p Rept no. FPRC-1352
Availability: Pub. in British Jnl. of Clinical Pharmacology, v2 p131-141 1975 (No copies furnished by DTIC).

No abstract available.

AD-A082 862/4 Not available NTIS
Defence Research Establishment Ottawa (Ontario)
A Comparative Study of the Radioprotective Effects of Cysteamine, WR-2721, and WR-1065 in Cultured Human Cells,
John W. Purdie. 23 Mar 78, 10p Rept no. DREO-780
Availability: Pub. in Radiation Research, v77 n2 p303-311 Feb 79 (No copies furnished by DTIC).

No abstract available.

AD-A082 918/4 Not available NTIS
Flying Personnel Research Committee London (England)
Performance Studies with Antihistamines,
Coral H. Clarke, and A. N. Nicholson. 22 Sep 77, 8p Rept no. FPRC/1383

Availability: Pub. in British Jnl. of Clinical Pharmacology, v6 p31-35 1978 (No copies furnished by DTIC).

No abstract available.

AD-A082 935/8 PC **A05**/MF **A01**
Miami Univ FL Leo Rane Research Lab
Screening and Evaluation of Experimental Antiparasitic Drugs.
Rept. no. 13 (Annual), 1 Oct 77-30 Sep 78,
Arba L. Ager, Jr. Aug 79, 95p
Contract DAMD17-76-C-6056

The investigations undertaken during this report period included two primary and one secondary drug screening program in malaria, along with a primary and secondary drug screening program in African trypanosomiasis. The malarial system used Plasmodium berghei infected mice and Anopheles stephensi mosquitoes, while the African trypanosomiasis system used Trypanosoma rhodesiense infected mice. The first primary drug screen in malaria assessed compounds for blood schizonticidal activity. 5,375 three dose level tests were done with 1,261 exhibiting blood schizonticidal activity. The second primary screen in malaria assessed compounds for prophylactic antimalarial activity against sporozoite induced infections. 2,320 three dose level tests were performed to detect activity against sporozoites and/or exoerythrocytic stages. 161 compounds were curative with 116 of these being more active than primaquine. In the secondary drug screening program 49 compounds were found to be more active than quinine when administered via the oral and subcutaneous routes. The most active compounds were WR 223,146, WR 226,337 and WR 228,710. eighty-six compounds were tested against one or more of the following lines resistant to chloroquine, cycloguanil, dapsone, mefloquine, pyrimethamine, or quinine, respectively.

PB80-175482 PC **A22**/MF **A01**
National Inst. on Drug Abuse, Rockville, MD. Div. of Research.
Problems of Drug Dependence, 1979: Proceedings of the Annual Scientific Meeting (41st), the Committee on Problems of Drug Dependence, Inc., Held at Philadelphia, Pennsylvania on June 4-6, 1979.
Research monograph,
Louis S. Harris. 1980, 503p DHEW/PUB/ADM-80-901, NIDA/RD-80-01
See also PB-279 515. Library of Congress catalog card no. 80-600008. Also pub. as National Inst. on Drug Abuse Research Mono. 27.

The Committee on Problems of Drug Dependence, for 47 years affiliated with the National Academy of Sciences-National Research Council is now independently corporated. Membership in this highly respected group is drawn from all fields of clinical medicine, psychiatry, public health, pharmacology, chemistry, and the social sciences. A comprehensive range of reports on ongoing research in the biomedical, behavioral, and social sciences, presented at the annual scientific meeting, will be condensed in this volume, offering an up-to-date review of the whole field of drug dependence and abuse.

PB80-915900 Subscription
Food and Drug Administration, Rockville, MD. Bureau of Drugs.
New Drug: Summary of Basis for Approval.
Monthly repts.
1980, 12 issues
Paper copy available on subscription, North American Continent price $140.00/year; all others write for quote. Single copies also available.

The publication complements FDA Drug and Device Product Approvals by providing summaries of the scientific studies evaluated by FDA during the drug approval process. It contains a 'Summary Basis for Approval' for each original New Drug Application (NDA) and Antibiotic Form 5 approved during the previous month. Summaries prepared for supplemental NDA approvals involving a new use of the drug or a substantially different dosage will be included.

6P. Physiology

AD-A082 495/3 PC **A03**/MF **A01**
Letterman Army Inst of Research San Francisco CA
Metabolic Aspects of Caloric Restriction (500 Calories): Body Composition Changes.
Final rept.,
Harry J. Krzywicki, C. Frank Consolazio, Herman L. Johnson, and Norman F. Witt. Aug 79, 28p
Rept no. LAIR-73

Body composition changes in 8 healthy adult males (19 to 21 years of age) were studied while subsisting on a daily liquid test containing 340 kcal from carbohydrate and 160 kcal from protein for a 10-day period. Half of the subjects (Group I) were denied minerals with the remaining half (Group II) receiving a daily mineral supplement. Body weight losses were still severe (5.51 and 4.67 kg) in Groups I and II, respectively. This loss was further partitioned into 3.59 kg of fat, 1.4 kg of water, and 0.39 kg of dry protein in Group I, while Group II showed losses of 2.76 kg of fat, 1.32 kg of water and 0.39 kg of dry protein. The observed total body water (D2O dilution) loss was lesser in both groups than observed in previous studies. The largest amount of water was lost by the group which was denied minerals. This indicates the water sparing and fat utilizing effects of limited carbohydrate and protein with mineral supplementation. The skinfold thicknesses of both groups were also decreased during caloric restriction. Lesser changes were noted when minerals were included in the diet. The data indicate that the small quantity of protein in the diet was somewhat beneficial in sparing body protein. (Author)

AD-A082 541/4 PC **A03**/MF **A01**
Wright State Univ Dayton OH Dept of Psychology
Detection of Moving Targets in Peripheral Vision.
Final rept. Jun 78-Jul 79,
Frank E. Ward. Dec 79, 26p AFOSR-TR-80-0211
Grant AFOSR-78-3647

Human detection of a moving target is a function of (1) target size and contrast and (2) target velocity. Recent work in human psychophysics and animal electrophysiology has shown that visual information is processed in many 'channels', each specialized to detect a particular aspect of of the visual stimulus. For example, the human visual system appears to contain channels sensitive to spatial frequency (or target size). It has also been shown that different spatial frequencies are processed at different temporal rates (Tyman and Sekuler, 1974; Breitmeyer, 1975), suggesting that detection may depend upon an interaction of target size and velocity.

AD-A082 590/1 PC **A02**/MF **A01**
Boston Univ MA School of Medicine
Ultrastructural Alterations and Phagocytic Function of Cryopreserved Platelets,
J. I. Spector, W. J. Flor, and C. R. Valeri. 11 Apr 78, 7p
Contract N00014-79-C-0168
Pub. in Transfusion, v19 n3 p307-312 May-Jun 79.

No abstract available.

AD-A082 644/6 Not available NTIS
Emory Univ Atlanta GA Dept of Physiology
Localized Embedding of Labelled Microspheres by Microwave Heating in Tissues of Hypothermic Dogs. V. Popovic and Pava Popovic.
4 Nov 77, 7p
Availability: Pub. in Radio Science, v14 n6S p313-319 Nov-Dec 79 (No copies furnished by DTIC).

No abstract available.

AD-A082 649/5 PC **A02**/MF **A01**
Armed Forces Radiobiology Research Inst Bethesda MD
Experimental Acute Balloon Compression of the Spinal Cord: Factors Affecting Disappearance and Return of the Spinal Evoked Response,
Arthur I. Kobrine, Delbert E. Evans, and Hugo V. Rizzoli. 1978, 8p
Pub. in Jnl. of Neurosurgery, v51 n6 p841-845 Dec 79.

No abstract available.

AD-A082 660/2 PC **A02**/MF **A01**
California Univ San Diego La Jolla School of Medicine
Effect of Hyperbaric Oxygen on Sodium Transport and Cell Ultrastructure in the Toad Bladder,
S. A. Mendoza, J. H. Miller, and D. Hall. 1977, 10p
Contract N00014-76-C-0921
Pub. in Proceedings of the International Congress on Hyperbaric Medicine (6th), Aberdeen Univ. (Scotland), p22-28 1977.

No abstract available.

AD-A082 662/8 PC **A02**/MF **A01**
Boston Univ MA School of Medicine
Human Red Blood Cells with Normal or Improved Oxygen Transport Function Prepared and Frozen in the Primary Polyvinyl Chloride Plastic Blood Collection Container,
C. R. Valeri, D. A. Valeri, R. C. Dennis, J. J. Vecchione, and C. P. Emerson. 14 Aug 79, 22p
Contract N00014-79-C-0168
Pub. in Blood Transfusion and Immunohaematology, v22 n5 p467-486 1979.

No abstract available.

AD-A082 712/1 PC **A02**/MF **A01**
Kentucky Univ Lexington Dept of Anatomy
Studies of Rat Limb Peripheral Nerve Regeneration.
Annual rept. 1 Apr 79-1 Jan 80,
Stephen D. Smith, and William G. Winter. 1 Jan 80, 9p Rept no. TR-1
Contract N00014-79-C-0332

This report outlines the methodology and preliminary results of a study in which adult rat limbs were severed at mid-forearm, then subjected to battery-powered implants with either the positive or negative lead placed at the wound surface. When suitably placed, and if the negative lead were distal, the rats regenerated a remarkable array of tissues in an organized fashion, including cartilage, bone, muscle, and connective tissue. In some cases structures normal to the limb were formed. These included well-formed joints and bones of the carpal and metacarpal series. A second set of experiments involved the implantation of silver-platinum electrogenic couples across the severed sciatic nerves of adult rats. If the cathode lay distal to the gap, regeneration of the nerves across the gap was accelerated. This result was confirmed by examination of the nerves by autoradiography, direct gross examination, histological/stereological methods, and measurement of Compound Action potentials. (Author)

AD-A082 860/8 Not available NTIS
Defence and Civil Inst of Environmental Medicine Downsview (Ontario)
Neuromathematical Concepts of Point Process Theory,
Jack P. Landolt, and Manning J. Correia. 18 Jan 77, 12p Rept no. DCIEM-PUB-76X48
Availability: Pub. in IEEE Transactions on Biomedical Engineering, vBME-25 n1 p1-12 Jan 78 (No copies furnished by DTIC).

No abstract available.

AD-A082 897/0 PC **A02**/MF **A01**
Human Engineering Lab Aberdeen Proving Ground MD
Auditory and Visual Evoked Potentials to Irrelevant Stimuli During Conditioning to a Visual Stimulus.
Final rept.,
B. Wayne Anderson, and Lynn C. Oatman. 1980, 15p Rept no. HEL-TM-5-80
Pub. in Neurological Research, v1 n3 p281-290 1980.

No abstract available.

AD-A082 899/6 Not available NTIS
Texas Univ Medical Branch At Galveston
Wiener Kernels and Frequency Response Functions for the Human Retina.
Arthur Koblasz, James L. Rae, Manning J. Correia, and Ming-Duenn Ni. 12 Nov 78, 10p

Contract N00014-76-C-0622, Grant PHS-EY-03282
Sponsored in part by Grant PHS-EY-03022.
Availability: Pub. in IEEE Transactions on Biomedical Engineering, vBME-27 n2 p68-75 Feb 80 (No copies furnished by DTIC).

No abstract available.

AD-A082 912/7 Not available NTIS
Defence and Civil Inst of Environmental Medicine Downsview (Ontario)
Experiments on the Mechanism of Meniere Attacks.
G. F. Dohlman. 2 Jun 76, 22p Rept no. DCIEM-75-X-12
Availability: Pub. in Jnl. of Otolaryngology, v6 n2 p135-156 1977 (No copies furnished by DTIC).

No abstract available.

AD-A082 931/7 PC **A07**/MF **A01**
Army Research Inst for the Behavioral and Social Sciences Alexandria VA
Evaluation of the Utility of the Theory of Signal Detection for Target Acquisition Studies.
Final rept.,
Halim Ozkaptan. Oct 79, 150p Rept no. ARI-TR-405

This study explored the effects of instruction and target-to-background contrast, within the framework of signal detection theory, on the performance of Army aviators during a target acquisition task. Its goal was to determine whether the typical measures of target acquisition performance (reaction time and frequency of hits) would be influenced by the type of experimental instructions given to the test participants, and whether the signal detection parameters of bias and sensitivity would reflect instructional and target-to-background contrast differences, respectively. In addition, a critical goal was to determine whether the signal detection measures could be used, by means of an analysis of covariance, to remove the bias effects of instructional difference from the reaction time and frequency of hit data. A target acquisition task during a simulated helicopter pop-up maneuver at one thousand feet altitude was presented, with a 30-second exposure time. The observer's task was to search for a single 20-foot military tank in various field locations, and at a slant range of 2500 feet. The scenes were presented with and without targets, in order to obtain an observer's hit rate and false alarm rate, the basic procedural requirement for signal detection theory.

N80-21019/8 PC **A02**/MF **A01**
National Aeronautics and Space Administration, Washington, DC.
Initial Dynamics of the EKG During an Electrical Defibrillation of the Heart.
I. I. Bikov, Y. P. Chebotarov, and V. G. Nikolaev. Apr 80, 12p NASA-TM-76002
Transl. Into English from Fiziol. Zh. Akad. Nauk Ukr Ssr (USSR), V. 15, No. 3, 1969 p 322-327. Transl. By Kanner (Leo) Associates, Redwood City, Calif.

In tests on 11 mature dogs, immobilized by means of an automatic blocking and synchronization system, artefact free EKG were obtained, beginning 0.04-0.06 sec after passage of a defibrillating current. Different versions of the start of fibrillation were noted, in application of the defibrillating stimulus in the early phase of the cardiac cycle. A swinging phenomenon, increasing amplitude, of fibrillation was noted for 0.4-1.5 sec after delivery of a subthreshold stimulus. Conditions for a positive outcome of repeated defibrillation were found, and a relationship was noted between the configuration of the exciting process with respect to the lines of force of the defibrillating current and the defibrillation threshold. It was shown that the initial EKG dynamics after defibrillation is based on a gradual shift of the pacemaker from the myocardium of the ventricles to the sinus node, through phases of atrioventricular and atrial automatism.

6Q. Protective Equipment

AD-A082 818/6 PC **A02**/MF **A01**
ILC Dover Frederica DE Protective Equipment Div
Extra-Large Outergarment.
Final rept. 11 Jun 79-29 Mar 80,
Charles R. Sandy. 28 Mar 80, 6p
Contract DAAK11-79-C-0066

This task was authorized to create an Extra-Large sized DPE Outergarment. Patterning and tooling were performed. Prototype units passed fit check, endurance and burst testing. Final configuration included enlarged vertical trunk circumference, enlarged torso circumference, and a crotch patch. (Author)

AD-A082 819/4 PC **A02**/MF **A01**
ILC Dover Frederica DE Protective Equipment Div
Glove Tooling Redesign.
Final rept. 12 Jun 79-29 Mar 80,
Charles R. Sandy. 28 Mar 80, 5p
Contract DAAK11-79-C-0066

This task was authorized to redesign the glove attachment on the DPE Outergarment so that the heat seal overlaps the cuff making peel loading impossible during inspection. The tooling was designed, fabricated, and tested. It succeeds in preventing peel loading of the seam while maintaining the same shear strength as with the previous tooling. (Author)

AD-A082 820/2 PC **A02**/MF **A01**
ILC Dover Frederica DE Protective Equipment Div
Visor Optimization.
Final rept. 12 Jun 79-29 Mar 80,
Charles R. Sandy. 28 Mar 80, 5p
Contract DAAK11-79-C-0066

This task was authorized to redesign the visor closure tools on the DPE Outergarment in order to eliminate cutting of the vinyl visor material. The tooling was designed, fabricated and tested. It succeeds in preventing cutting of the vinyl visor material while maintaining the peel strength of the seam required per specification. (Author)

AD-A082 832/7 PC **A02**/MF **A01**
ILC Dover Frederica DE Protective Equipment Div
DPE Display Cover.
Final rept. 25 Sep 79-29 Mar 80,
Charles R. Sandy. 28 Mar 80, 4p
Contract DAAK11-79-C-0066

This task was authorized to fabricate a display cover for the DPE due to the many inquiries and requests to see the DPE. The materials were procured and the display cover was fabricated. (Author)

AD-A082 964/8 PC **A05**/MF **A01**
Army Aeromedical Research Lab Fort Rucker AL
A Fire Simulator/Shutter System for Testing Protective Fabrics and Calibrating Thermal Sensors.
Final rept.,
Francis S. Knox, III, P. W. Sauermilch, T. L. Wachtel, G. R. McCahan, Jr., and W. P. Trevethan. Mar 79, 77p Rept no. USAARL-79-4

The design, construction, calibration, and use of a JP-4 fueled, shuttered furnace is described. Based on a NASA design, this furnace simulates the radiative and convective thermal environment of a postcrash fire in rotary-wing aircraft. Heat fluxes ranged from 0.5 to 3.6 + or - 3% calories per square centimeter per second with steady-state furnace wall temperatures from 519 C (967 F) to 1353 C (2450 F) and a radiative/total flux ratio of approximately 0.9. A pneumatically propelled, water cooled shutter, mounted in a rolling animal carrier, controlled the exposure of pigs and thermal sensors to the fire. An electronic data acquisition and control system is also described. This system automatically controlled the opening and closing of the shutter and provided strip chart and FM magnetic tape records of exposure time, furnace wall temperature, heat flux, and sensor output. Sources of error including nonuniformity of flame front and shutter dynamics are discussed. Methods of animal handling, burn grading, and photographic documentation are introduced along with a brief description of some nine experimental protocols carried out using this fire simulator shutter system. (Author)

LA-8164-MS PC **A03**/MF **A01**
Los Alamos Scientific Lab., NM.
Permeation of Protective Garment Material by Liquid Benzene.
R. W. Weeks, Jr., and M. J. McLeod. Dec 79, 28p
Contract W-7405-ENG-36

The chemical compound benzene (C sub 6 H sub 6) has a melting point of 5.5 exp 0 C, a boiling point of 80.1 exp 0 C, and is widely used as a solvent and chemical intermediate throughout the chemical, petrochemical, and associated industries. Although the toxic and carcinogenic natures of benzene have been known for some time, the strict 1 ppM regulation governing human exposure to it as a vapor or a liquid is relatively recent. Because of regulations and concern, the National Institute for Occupational Safety and Health requested that a study be performed to determine the rate at which liquid benzene would permeate certain protective garment materials. Accordingly, this work presents the results of such measurements on butyl, natural, neoprene, nitrile, surgical, Tyvek, vinyl and Viton rubbers and elastomers, and the following composites or supported elastomers: butyl-coated nylon, ethylene vinyl acetate/polyethylene-coated polyester, polyethylene-coated Tyvek, and polyvinyl alcohol. Included in these determinations were studies to correlate the protective clothing swelling or weight change following immersion in benzene with the actual rate at which the materials were permeated by benzene so that ultimately a screening test might be recommended concerning the permeation or lack of permeation through given materials. (ERA citation 05:012668)

PAT-APPL-6-041 037 PC **A02**/MF **A01**
Department of the Navy Washington DC
Diver's Suit Excess Gas Exhaust Valve.
Patent Application,
Charles H. Dickson. Filed 21 May 79, 15p AD-D007 153/0
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A valve for controlling venting of excess gas from a diving suit includes a valve body housing first and second rubber check valves arranged in series. A control knob is rotatable on the valve body to selectively open or close outlet ports for venting gas from between the check valves and to actuate a member to selectively either hold the first check valve closed or to allow it function. (Author)

Y-DK-109 PC **A02**/MF **A01**
Oak Ridge Y-12 Plant, TN.
MOCA Permeation of Protective Clothing.
R. W. Morrow, and J. H. Hamilton. 7 Nov 79, 6p
Contract W-7405-ENG-26

At the Oak Ridge Y-12 Plant several types of protective clothing were tested for permeation by MOCA (4,-4' methylene bis-2-chloroaniline) and by MOCA-Adiprene L-100 mixtures. A sampling device was designed to allow the MOCA or the mixture to be placed on one side of the test specimen and the other side to be smear tested at later points in time. Results are presented in tables. (ERA citation 05:012675)

6R. Radiobiology

AD-A082 538/0 PC **A03**/MF **A01**
SRI International Arlington VA
On the Interaction of Non-Ionizing Radiation with People.
Technical rept.,
Malvin A. Ruderman, and Gordon J. MacDonald. Mar 80, 47p Rept no. SRI-JSR-79-14
Contract MDA903-78-C-0086, ARPA Order-2504

This report examines the physical basis for many of the thermal and non-thermal interactions between microwaves and the human body. Although a microwave beam incident on the human body dissipates, on the average, about the same amount of heat as does normal metabolism, it can actually dissipate considerably more heat in certain local regions of the body because of strong beam focusing effects (e.g., within the brain), flow of induced currents through small, constricted areas of the body (e.g., ankle, neck) and differences in electrical properties among body tissues. Since relatively large heat dissipation can occur on a local level, it would appear more rational to determine a maximum permissive radiation exposure in terms of maximum allowed dissipation in a specific sensitive part of the body rather than, as is

presently done, in terms of external beam intensity (the present U.S. standard is 10 milliwatts/sq cm). For non-thermal processes, no special biological process or structure has been identified as likely to be especially sensitive to microwave fields or frequencies. The experimental results designed to explore the non-thermal effect of microwaves were studied. The results of all experiments purporting to demonstrate a significant non-thermal biological effect have been disputed; in fact, very few experiments in the entire field have ever been replicated -- a situation which should be rectified. (Author)

AD-A082 645/3 PC **A03**/MF **A01**
Armed Forces Radiobiology Research Inst Bethesda MD
Behavioral and Physiological Changes Produced by a Supralethal Dose of Ionizing Radiation: Evidence for Hormone-Influenced Sex Differences in the Rat,
G. Andrew Mickley. 7 Mar 79, 30p
Pub. in Radiation Research, v81 p48-75 1980.

No abstract available.

AD-A082 648/7 PC **A02**/MF **A01**
Armed Forces Radiobiology Research Inst Bethesda MD
Experimental Delayed Radiation Necrosis of the Brain. Part 1. Effect of Early Dexamethasone Treatment,
Albert N. Martins, Ralph E. Severance, James M. Henry, and Thomas F. Doyle. 1979, 14p
Pub. in Jnl. of Neurosurgery, v51 p587-596 Nov 79.

No abstract available.

AD-A082 703/0 Not available NTIS
Flying Personnel Research Committee London (England)
The Role of Fluorescein Angiography in the Detection of Laser-Induced Damage to the Retina: A Threshold Study for Q-Switched, Neodymium and Ruby Lasers,
R. G. Borland, D. H. Brennan, J. Marshall, and J. P. Viveash. 12 May 78, 25p Rept no. FPRC-1373
Availability: Pub. in Experimental Eye Research, v27 p471-493 1978 (No copies furnished by DTIC).

No abstract available.

AD-A082 901/0 PC **A02**/MF **A01**
Walter Reed Army Inst of Research Washington DC
The Inactivation of Rodent Brain Enzymes in Vivo Using High-Intensity Microwave Irradiation,
James L. Meyerhoff, Robert H. Lenox, Peter V. Brown, and Om P. Gandhi. 9 Jul 79, 7p
Pub. in Proceedings of the IEEE, v68 n1 p155-159 Jan 80.

No abstract available.

BNL-27175 PC **A03**/MF **A01**
Brookhaven National Lab., Upton, NY.
Splenic Sequestration of Tc-99M Labeled Heat Treated Red Blood Cells.
H. L. Atkins, A. G. Goldman, R. G. Fairchild, Z. H. Oster, and P. Som. 1979, 26p CONF-791165-1
Contract EY-76-C-02-0016
65. annual meeting of the Radiological Society of North America, Atlanta, GA, USA, 25 Nov 1979.

The rate of blood clearance and spleen uptake as well as the total spleen uptake of heat damaged red blood cells labeled with Tc-99m was determined in eight patients, six of whom had chronic lymphatic leukemia, one had polycythemia vera and one had eosinophilia of unknown origin. Spleen uptake at 2 hrs was 72.0 +- 18.5%. Approximately 82.6% of the initial radioactivity was cleared from the blood by 2 hrs with a rapid T 1/2 component of 6.3 +- 4.7 min. The T 1/2 of splenic uptake was 8.3 +- 4.6 min with a plateauing of splenic radioactivity by 30 min. The preliminary results indicate that the method of preparation is reliable but the usefulness of the method for evaluating spleen function remains to be determined. (ERA citation 05:014351)

BNL-51066 PC **A04**/MF **A01**
Brookhaven National Lab., Upton, NY.
Safety and Environmental Protection Division. Progress Report, January 1, 1976-December 31, 1978.
Oct 79, 67p
Contract EY-76-C-02-0016

Dosimetry and radiological physics studies during 1976 and 1977 at BNL are described. (ERA citation 05:012792)

COGEMA-R-2 PC **A16**/MF **A01**
Compagnie Generale des Matieres Nucleaires, Centre de Pierrelatte (France).
Daily Radiotoxicological Supervision of Personnel at the Pierrelatte Industrial Complex. Methods and Results.
These (D. Biol. Hum.),
Jacques Chalabreysse. May 78, 372p
In French.
U.S. Sales Only.

A 13 year experience gained from daily radiotoxicological supervision of personnel at the PIERRELATTE industrial complex is presented. This study is divided into two parts: part one is theoretical: bibliographical synthesis of all scattered documents and publications; a homogeneous survey of all literature on the subject is thus available. Part two reviews the experience gained in professional surroundings: laboratory measurements and analyses (development of methods and daily applications); mathematical formulae to answer the first questions which arise before an individual liable to be contaminated; results obtained at PIERRELATTE. (Atomindex citation 10:463228)

CONF-781016- PC**$10.50**
Biological Effects of Extremely Low Frequency Electromagnetic Fields.
R. D. Phillips, M. F. Gillis, W. T. Kaune, and D. D. Mahlum. 1979, 593p
18. annual Hanford life sciences symposium, Richland, WA, USA, 16 Oct 1978.

The purpose of the symposium was to assemble researchers in the ELF bioeffects community to present and discuss recent results of experimental and theoretical work dealing with exposure system design, field interactions with living matter, biological and ecological effects, epidemiological surveys, and engineering field studies of relevance to the exposure of man and his environment to ELF fields. For this purpose we defined extremely low frequency fields as electric, magnetic, or electromagnetic fields ranging in fundamental frequency from 0 to 100 Hz. The intent was to emphasize research that could be directly related to exposures associated with contemporary or planned systems for energy production, transmission, and use. We also invited papers on more fundamental research to encourage scientific inquiry into mechanisms by which ELF fields of insensible intensity might interact with living materials to alter biological function. (ERA citation 05:014392)

CONF-790229-4 PC **A04**/MF **A01**
Hahnemann Medical Coll. and Hospital, Philadelphia, PA.
Oxygen-Dependent Sensitization of Irradiated Cells.
D. Ewing, and E. L. Powers. 1979, 64p
Contract EY-76-S-05-3408
32. annual symposium on fundamental cancer research, Houston, TX, USA, 27 Feb 1979.

Attention is focused primarily on O sub 2 effects in three biological systems, all tested in suspension: bacterial spores, vegetative bacterial cells, and mammalian cells. Information from these systems shows that O sub 2 has more than one process through which it can act. Studies with bacterial spore suspensions provide clear evidence that multiple components to oxygen-dependent radiation sensitization exist. Studies with mammalian cell suspensions also show that at least two oxygen-dependent sensitization processes can be distinguished. Similar studies with vegetative bacteria in suspension have not resolved oxic sensitization into components. The roles of water-derived radicals in radiation sensitivity and, specifically, in sensitization by O sub 2 were examined. OH radicals are clearly implicated in damage in all three biological test systems. However, the specific roles proposed for OH radicals are different in these organisms. In bacterial spores, OH radical removal in itself does not protect in anoxia or in high concentrations of O sub 2 . OH radical removal over a limited intermediate range of O sub 2 concentrations will, however, protect. OH radical scavenging probably results in the formation of the actual protector. In bacteria, the supposition is that OH radical removal will protect both in anoxia and in the presence of O sub 2 . OH radicals probably react with a cellular target molecule and leave a radicalsite; this is the site which can then react with O sub 2 to cause damage; DNA is the likely cellular target. In mammalian cells, a reaction scheme, similar to that proposed for bacteria, has been suggested for O sub 2 -dependent sensitization. (ERA citation 05:014304)

CONF-790524-12 PC **A02**/MF **A01**
National Inst. of Genetics, Mishima (Japan).
Combined Genetic Effects of Chemicals and Radiation.
T. Kada, T. Inoue, A. Yokoiyama, and L. B. Russel. 1979, 10p
Contract W-7405-ENG-26
International congress symposium on radiation research and stem cells, Tokyo, Japan, 13 May 1979.

Interactions of chemicals and radiation are complex and there may exist other unexpected patterns that are not mentioned. We show some examples. Photodynamic mutation induction by fluorescein dyes and Radiosensitization with iodine compounds are classified as Interactions of chemicals and radiation outside of the cell. On the other hand, the Antimutagenic effects of cobaltous chloride is concerned with events taking place in cells that had already been exposed to a mutagenic agent. It is likely that the action of a mutagenic agent is not direct and that cellular functions, such as mutators or repair systems, are involved in the mutagenesis initiated by the agent. Such cellular functions can be affected by a second agent. In sexually reproducing organisms, the two agents can also act on separate cells (male and female germcells) which subsequently fuse. Interaction effects of all types will be useful in future research in shedding light on the main pathways of mutagenesis. (ERA citation 05:010656)

CONF-791077-3 PC **A02**/MF **A01**
Argonne National Lab., IL.
Plutonium Microdistribution in Human Bone.
R. A. Schlenker, and B. G. Oltman. 1979, 16p
Contract W-31-109-ENG-38
Workshop on measurement and interpretation of actinide accumulation by man, Snowbird, UT, USA, 14 Oct 1979.

The amount and location of plutonium in bone from three humans injected during the mid-1940's has been studied by autoradiography and alpha particle spectrometry. Concentrations are similar on endosteal surfaces, Haversian canal surfaces and periosteal surfaces of long bone midshafts 17 months after injection. Endosteal surface concentrations are higher in the axial skeleton than in the appendicular skeleton 15 and 17 months post injection. For dosimetric purposes, volume deposits may be considered to be infinitely thick whereas surface deposits may be considered to have zero thickness. Secondary surface deposits are dosimetrically important, even when the plutonium is almost completely deposited in bone volume. (ERA citation 05:012624)

COO-3377-T1 PC **A03**/MF **A01**
Cabrini Medical Center, New York.
New Jersey Radium Research Project: Final Report.
W. D. Sharpe. 1979, 33p
Contract EY-76-S-02-3377

Cancers among dead New Jersey subjects were almost three times the expected number. Their radiation experience apparently acted as a generalized carcinogen. Conventional clinical, laboratory and roentgenographic tests neither correlated with calculated radiation exposure nor predicted which subjects subsequently developed cancer. More subjects than expected were deaf and enough of the subjects had increased erythrocyte sedimentation rates and decreased alpha-1 serum globulin levels that both hearing tests and tests of immune competence should be undertaken among asymptomatic exposed populations at regular intervals to

see whether these may indicate radiation effects prior to a fatal cancer or blood dyscrasia. If preterminal radium-226 burdens validly express total irradiation experience, and past exposure to shorter-lived radium-228 (mesothorium) makes it unlikely that this is so, the distribution of radium osteitis among our subjects suggests that anatomically demonstrable radiation injury occurs in the vast majority of subjects with any radium-226 burden that can be measured above background levels after twenty-five years, and in almost half of those exposed whose measured radium-226 burdens are indistinguishable from background levels. Modification of the occupational exposure standard is recommended. (ERA citation 05:012603)

COO-3501-13 PC **A02**/MF **A01**
Rochester Univ., NY. School of Medicine and Dentistry.
Biological Effects of Ionizing Radiation at the Molecular, Cellular and Organismal Levels. Annual Progress Report, October 15, 1978-October 14, 1979.
C. S. Lange. 1979, 13p
Contract EY-76-S-02-3501

The Zimm theory of rotor speed dependent DNA sedimentation has been tested quantitatively and found to be correct as predicted by the equation of Zimm and Schumaker. The quantitative validity of the theory means that the size of a DNA sedimenting under speed-dependent conditions is not undefinable but rather can be uniquely obtained by the application of that theory to the data. The viscoelastic recoil or more accurately, the zero shear rate reduced recoil has been shown to be a quantitative direct function of the number of intact DNA molecules present in solution. This demonstration made possible the measurement of a direct survival curve for intact DNA molecules after exposure to ionizing radiation. A D sub 37 of 49.5 krads was obtained for the DNA of T4c coliphage irradiated as a solution of phage particles. It is noteworthy that this survival curve measures the number of intact DNA molecules, not the average number of breaks/molecule. (ERA citation 05:014295)

DP-MS-79-47 PC **A03**/MF **A01**
Du Pont de Nemours (E.I.) and Co., Aiken, SC. Savannah River Lab.
Population Dose from LWR Fuel Reprocessing.
J. F. Schubert, R. E. Cooper, J. R. Watts, and C. E. Bailey. 1979, 33p CONF-791103-65
Contract EY-76-C-09-0001
American Nuclear Society meeting, San Francisco, CA, USA, 12 Nov 1979.

The inhalation, submersion, and food ingestion dose to the regional and US population are calculated for estimated releases of radionuclides from a hypothetical LWR nuclear fuel reprocessing plant located in southeastern United States. A mathematical transport, diffusion, and deposition model was used to obtain the air concentrations and ground deposition of the various radionuclides emitted to the atmosphere from the reprocessing facility. The global population dose from atmospheric submersion was also calculated for exp 3 H, exp 14 C, and exp 85 Kr. The total exposure to persons living in the region of the plant would be 0.2% of background. (ERA citation 05:012625)

EMSL-LV-0539-26 PC **A05**/MF **A01**
Environmental Monitoring and Support Lab, Las Vegas, NV.
Animal Investigation Program: Nevada Test Site and Vicinity. Annual Report, 1977.
D. D. Smith, A. B. Crockett, D. E. Bernhardt, K. R. Giles, and R. R. Kinnison. Jul 79, 98p
Contract EY-76-A-08-0539

Data are presented from the radioanalysis of tissues collected from cattle, mule deer, desert bighorn sheep, rabbits, feral horses, and other wildlife that resided on or near the Nevada Test Site. Routine activities and special investigations of the Animal Investigation Program are also discussed. Other than potassium-40, gamma-emitting radionuclides were detected infrequently. Strontium-90 concentrations in bones from deer, cattle, and desert bighorn sheep continued the downward trend of recent years. Tritium concentrations were generally within expected environmental limits with the exception of animals exposed to sources of contamination. Radionuclide tissue concentrations were generally higher in the tissues of animals residing in Area 15 than in other areas. Statistical analyses made of plutonium-239 levels reported in cattle tissue collected from 1971 through 1977 reveal that activity levels in lungs, liver, and bone are significantly related to age. Activity levels did not change significantly in the ingesta and lungs during this time but did tend to increase for bone and liver. Activity levels in the ingesta are significantly higher in the fall than in the spring. Hypothetical dose estimates to man were calculated on the basis of liver or muscle from animals that contained peak radionuclide levels. The highest postulated dose was 8.6 millirems for tritium in tissues from a mule deer. The movements of 17 mule deer were monitored on a weekly basis.During the winter months, all deer left their summer range on the mesas of the Nevada Test Site and migrated 40 to 60 kilometers south and west. A statistical estimate was made of the deer population in selected areas utilizing the marked deer as a basis for this estimate. No gross or microscopic lesions were found in necropsied animals that could be directly attributed to the effects of ionizing radiation. (ERA citation 05:012513)

EMSL-LV-0539-28 PC **A02**/MF **A01**
Environmental Monitoring Systems Lab., Las Vegas, NV.
Comparison of the Solubility of Plutonium-238 and Plutonium-239 Dioxide in in Vitro Bovine Ruminal-Gastrointestinal Fluids.
Nov 79, 15p
Contract EY-76-A-08-0539

The alimentary solubility and behavior of plutonium-238 dioxide and plutonium-239 dioxide were compared in an artificial rumen and simulated bovine gastrointestinal fluids. Rumen juice was augmented with plutonium-238 dioxide particles of 0.096- mu m count median diameter or plutonium-239 dioxide particles of 0.121- mu m count median diameter and incubated for 24 hours. This juice was successively converted by the addition of bile and enzymes and adjustment of the pH to simulate the digestive stages of the abomasum, duodenum, jejunum, and lower small intestine. Fluid samples were collected from each of these digestive stages and radioanalyzed for soluble plutonium-238 or plutonium-239. Shortly after the addition of plutonium-238 dioxide to rumen juice, an average of 0.12 percent became soluble while 0.33 percent became soluble following the incubation period. The solubility increased to 0.05 percent following the abomasal incubation period and increased to 0.79 percent and 1.10 percent when the fluid was maintained at pH 4.0 and 5.0, respectively, during the duodenal phase. The solubility increased to 3.20 percent following the addition of bile and enzymes and adjustment of the pH to 6.0 and to 3.62 percent following the 2-hour jejunal incubation period. Plutonium-239 dioxide was 0.00123 percent soluble shortly after being administered to the rumen juice while 0.00256 percent became soluble following the incubation period. Following the abomasal incubation period the solubility decreased to 0.00189 percent and then increased to 0.00604 percent when the fluid was held at pH 4.5 to simulate the duodenum. There was a further increase in solubility to 0.0138 percent following the jejunal incubation phase. (ERA citation 05:014228)

IEA-INF-062 PC **A02**/MF **A01**
Instituto de Energia Atomica, Sao Paulo (Brazil). Centro de Protecao Radiologica e Dosimetria.
Some Aspects of Radiological Protection in Uranium Mines.
E. Palacios, and C. M. Napolitano. Nov 78, 10p
In Portuguese.
U.S. Sales Only.

The basic principles of radiation protection recommended by the International Commission on Radiological Protection - ICRP are presented and the main radiological risks for the uranium mining workers are discussed. Finally some criteria for planning the radioactive waste management in uranium mines are given. (Atomindex citation 10:463400)

LA-UR-79-3316 PC **A03**/MF **A01**
Los Alamos Scientific Lab., NM.
Studies on Health Risks to Persons Exposed to Plutonium.
G. L. Voelz, J. H. Stebbings, Jr., J. W. Healy, and L. H. Hempelmann. 1979, 29p CONF-791085-3
Contract W-7405-ENG-36
Radiation accident preparedness conference, Oak Ridge, TN, USA, 19 Oct 1979.

Two studies on Los Alamos workers exposed to plutonium have shown no increase in cancers of the lung, bone, and liver, three principal cancers of interest following plutonium deposition. A clinical study of 26 workers exposed 32 years ago shows no cases of cancer other than two skin cancers that were excised successfully. A mortality study of 224 workers, all persons with estimated deposition of 10 nCi or moe in 1974, showed no excess of mortality due to any cause. No bone or liver cancers were present, while one death due to lung cancer was observed as compared to an expected three cases. These negative findings on such small groups are not able to prove or disprove the validity of commonly used risk estimates as recommended in the 1972 BEIR and 1977 UNSCEAR reports, but the data do indicate that much higher risk estimates are not warranted. (ERA citation 05:012626)

LA-UR-79-3378 PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
Pulmonary Carcinogenesis from Plutonium-Containing Particles.
R. G. Thomas, D. M. Smith, and E. C. Anderson. 1980, 5p CONF-800304-9
Contract W-7405-ENG-36
International congress of the International Radiation Protection Association, Jerusalem, Israel, 8 Mar 1980.

Plutonium administered as an alpha radiation source to the respiratory tracts of Syrian hamsters has resulted in various incidences of neoplasia. Adenomas are the primary lung tumor observed, but adenocarcinomas are also prevalent. (ERA citation 05:012629)

NUREG/CR-1304 PC **A06**/MF **A01**
Michigan Univ., Ann Arbor. School of Public Health.
Performance Testing of Personnel Dosimetry Services.
Supplementary rept. Oct 77-31 Dec 79,
Phillip Plato, and Glenn Hudson. Apr 80, 113p
Contract NRC-01-77-180
See also NUREG/CR-1064.

The University of Michigan conducted a two-year pilot study of the Health Physics Society Standards Committee (HPSSC) Standard, 'Criteria for Testing Personnel Dosimetry Performance.' After the pilot study was concluded on September 27, 1979, the HPSSC Standard was revised based, in part, on experiences and recommendations derived from the pilot study. The Nuclear Regulatory Commission extended the contract under which the pilot study was conducted primarily so the data produced during the pilot study could be examined using the revised HPSSC Standard. The results of this extension to the pilot study show that the passing rate increases substantially when the revised version of the Standard is used instead of the original version. Data are also given that show the percent of dosimeters used in the United States that are being processed by processors that passed the revised version of the HPSSC Standard. Finally, data are given that show that the production of bremsstrahlung is negligible for the strontium-90 source used during the pilot study, but that a processor that uses a deep depth considerably less than 1000 mg/sq. cm. will over-estimate deep doses for beta-plus-gamma irradiations.

ORNL/TM-6689 PC **A06**/MF **A01**
Oak Ridge National Lab., TN.
EDISTR: A Computer Program to Obtain a Nuclear Decay Data Base for Radiation Dosimetry.
L. T. Dillman. Jan 80, 122p
Contract W-7405-ENG-26

This report provides documentation for the computer program EDISTR. EDISTR uses basic radioactive decay data from the Evaluated Nuclear Structure Data File developed and maintained by the Nuclear Data Project at the Oak Ridge National Laboratory as input, and calculates the mean energies and absolute intensities of all principal radiations associated with the radioactive decay of a

nuclide. The program is intended to provide a physical data base for internal dosimetry calculations. The principal calculations performed by EDISTR are the determination of (1) the average energy of beta particles in a beta transition, (2) the beta spectrum as function of energy, (3) the energies and intensities of x-rays and Auger electrons generated by radioactive decay processes, (4) the bremsstrahlung spectra accompanying beta decay and monoenergetic Auger and internal conversion electrons, and (5) the radiations accompanying spontaneous fission. This report discusses the theoretical and empirical methods used in EDISTR and also practical aspects of the computer implementation of the theory. Detailed instructions for preparing input data for the computer program are included, along with examples and discussion of the output data generated by EDISTR. (ERA citation 05:010926)

ORNL/TM-7039 PC **A03**/MF **A01**
Oak Ridge National Lab., TN.
Estimated Radiological Doses to the Maximumly Exposed Individual and Downstream Populations from Releases of Tritium, Strontium-90, Ruthenium-106, and Cesium-137 from White Oak Dam.
C. A. Little, and S. J. Cotter. Jan 80, 41p
Contract W-7405-ENG-26

Concentrations of tritium, exp 90 Sr, exp 106 Ru, and exp 137 Cs in the Clinch River for 1978 were estimated by using the known 1978 releases of these nuclides from the White Oak Dam and diluting them by the integrated annual flow rate of the Clinch River. Estimates of 50-year dose commitment to a maximumly exposed individual were calculated for both aquatic and terestrial pathways of exposure. The maximumly exposed individual was assumed to reside at the mouth of White Oak Creek where it enters the Clinch River and obtain all foodstuffs and drinking water at that location. The estimated total-body dose from all pathways to the maximumly exposed individual as a result of 1978 releases was less than 1% of the dose expected from natural background. Using appropriate concentrations of to subject radionuclides diluted downstream, the doses to populations residing at Harriman, Kingston, Rockwood, Spring City, Soddy-Daisy, and Chattanooga were calculated for aquatic exposure pathways. The total-body dose estimated for aquatic pathways for the six cities was about 0.0002 times the expected dose from natural background. For the pathways considered in this report, the nuclide which contributed the largest fraction of dose was exp 90 Sr. The largest dose delivered by exp 90 Sr was to the bone of the subject individual or community. (ERA citation 05:014244)

ORO-2832-202 PC **A02**/MF **A01**
Texas Univ. at Houston. Dept. of Physics.
Radiation and Biophysical Studies on Cells and Viruses. Progress Report, July 1, 1978-August 30, 1979.
A. Cole. 1 Oct 79, 11p
Contract EY-76-S-05-2832

Ionizing radiation beams of low linear energy transfer (LET) and high LET (alpha particles) which penetrated part way into or completely through cell monolayers were used to study a variety of molecular and cellular responses including: DNA damage, chromosome aberrations, division delay, lethality, mutation, and transformation. Modifiers of radiation response such as oxygen tension, cell temperature, cell growth cycle stage, dose fractionation and/or post irradiation repair incubation were studied. The following properties were evaluated: cellular location of radiation susceptible sites, optimum action cross-sections, relative biological effectiveness (RBE) for high LET radiation, effect of radiation modifiers, and the kinetics of cell repair of the initial damage. Correlations among these properties suggested that similar genetic damage was involved in most responses. These and other data suggest that an important mode of genetic damage involves nuclear membrane associated DNA which suffers multiple proximate lesions induced by the high LET component of any form of ionizing radiation. Such damage may be assayed as a single or double strand DNA break but includes other DNA lesions in close proximity. Failure of the cell to properly repair such complex lesions may contribute to a variety of biological responses. (ERA citation 05:010657)

PB80-173743 PC **A03**/MF **A01**
Indianapolis Center for Advanced Research, Inc., IN. Ultrasound Research Labs.
Bioeffects of Ultrasound.
Progress rept. 1 Jul-31 Dec 77,
Francis J. Fry, and Laura K. Johnson. 6 Feb 78, 47p NSF/RA-780652
Grant NSF-APR75-14487

Results are reported of a study using intense ultrasound to destroy a solid tumor implanted in the hamster flank. Animals were irradiated with ultrasound as the sole mediating agent or in combination with a well-known chemotherapeutic agent, BCNU. Irradiations also were conducted on hamster medulloblastoma cells (HM) in suspension. These in vitro cells also were treated by ultrasound alone or in combination with BCNU. The solid tumor work shows that this rapid growing and always fatal tumor can be cured with intense, focused ultrasound at a reasonable rate by methods which have not been optimized. The intense ultrasound beam which in a specific regime produces a 20 percent cure rate, also tends to produce a secondary tumor site in 25 percent of the total number of irradiated animals. Use of a BCNU regime in combination with a similar ultrasound regime increases the cure rate to 50 percent, and secondary sites are seen in 8 percent of the irradiated animals. Irradiation of mammalian-derived tumor cell suspensions with ultrasound reduced average cell numbers when compared to the control group. The combination of BCNU and ultrasound leads to a larger percentage reduction than either modality alone.

PNL-SA-7257 PC **A02**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Environmental Processes Leading to the Presence of Organically Bound Plutonium in Plant Tissues Consumed by Animals.
R. E. Wildung, T. R. Garland, and D. A. Cataldo. Jan 79, 18p CONF-790325-10
Contract EY-76-C-06-1830
International symposium on biological implications of radionuclides released from nuclear industries, Vienna, Austria, 26 Mar 1979.

The long half-life of plutonium (Pu) and its possible entry into the environment as a result of the nuclear fuel cycle necessitate estimation of its availability to animals over thousands of years. A major uncertainty in this evaluation arises from the effects of physical and biogeochemical processes on Pu form and biological availability. However, a general understanding of the principal mechanisms governing Pu behavior in the terrestrial ingestion pathway is developing which ultimately should serve as a framework for estimation of long-term availability to animals. This review briefly integrates and synthesizes present information on the chemical/biochemical processes governing the form of Pu in soils and plants and the relationships of these phenomena to gut absorption in animals. A proposed model for Pu behavior will be used as a framework for integration of current knowledge. (ERA citation 05:010575)

PNL-SA-7502 PC **A02**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Metabolism and Biological Effects of alpha-Emitting Radionuclides.
W. J. Bair. May 79, 9p CONF-790524-14
Contract EY-76-C-06-1830
International congress symposium on radiation research and stem cells, Tokyo, Japan, 13 May 1979.

The emphasis of much of the current and planned research on the toxicity of alpha-emitting radionuclides is directed toward the complexities of actual and potential conditions of occupational environmental exposures of human beings. These, as well as the more limited studies on mechanisms of biological transport and effects, should increase our ability to predict health risks more accurately and to deal more confidently with human exposures, if and when they occur. (ERA citation 05:012610)

PNL-3089 PC **A06**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Dosimetry of Inhaled Plutonium-239 Dioxide in Rodent Lung: A Morphometric Study.
K. Rhoads. Jun 79, 124p
Contract EY-76-C-06-1830

Morphometric analysis of rat and hamster lung did not demonstrate any extensive changes in lung composition or structure following inhalation exposure to exp 239 Pu0 sub 2 at levels near that for maximum tumor yield in rats. The problem of dosimetry for this compound thus appears to be relatively uncomplicated by any major radiation-induced pathological alterations in the lung. Rat and hamster lung were found to be similar in structure and composition, with few significant differences which could be directly related to the different tumor responses. The distribution of exp 239 Pu0 sub 2 particles was not uniform in all regions of the lung; thus estimation of the dose to specific tissues or regions within the lung requires a correction for this effect. Species differences were found for particle distribution in the subpleural region and major airways, and in the spatial association of particles, both of which may affect the tumor development process. These regions contain the principal target cells for tumor production and serve as foci for the origin of tumors. Different dose distributions within these regions may therefore explain, at least in part, the difference in tumor response to inhaled exp 239 Pu0 sub 2 for rats and hamsters. (ERA citation 05:010672)

SBD-1014 PC **A04**/MF **A01**
Technische Hogeschool Eindhoven (Netherlands). Stralingsbeschermingsdienst.
Introduction to Radiation Hygiene.
Ch. J. Huyskens. Aug 78, 65p
In Dutch.
U.S. Sales Only.

Personnel who come into contact with any radiological activities are introduced to different aspects of radiation hygiene. The basic theory of radiation physics is given and units and dose equivalents are discussed. The biological effects of ionizing radiations are described and risk analysis is introduced. The various sources of radiation to which the population is exposed are outlined. Safety standards and legislation regarding radiation hygiene are described and the various methods and instruments for measuring radiation are given. Dosimetry and safety precautions and measures are finally discussed. (Atomindex citation 10:463396)

SLAC-PUB-2441 PC **A02**/MF **A01**
Stanford Linear Accelerator Center, CA.
Neutron Production and Leakage from Medical Electron Accelerators.
R. C. McCall, and W. P. Swanson. Dec 79, 4p CONF-800304-2
Contract EY-76-C-04-0789
International congress of the International Radiation Protection Association, Jerusalem, Israel, 8 Mar 1980.

For medical accelerators operating above about 10 MeV, there is an unavoidable production of photoneutrons which add to the head leakage. The yield of photoneutrons produced by electron beams incident on thick targets has been calculated and found to increase rapidly with primary electron energy up to approximately 25 MeV, and more slowly thereafter. Dividing the neutron fluence for W (or Pb) by the photon absorbed dose for the same conditions gives the ratio plotted. This ratio, representing the maximum achievable with practical materials, becomes nearly constant above about 25 MeV incident electron energy where its value is about 2.1 x 10 exp 5 neutrons cm exp -2 rad exp -1 . Measurements that fall significantly below the curve are likely due to photon absorption in components that are not high-Z materials, or measurements made with the moveable jaws open. Points that fall significantly above probably mean there is substantial loss of electron beam elsewhere than the intended target. (ERA citation 05:010927)

UCD-472-125 PC **A12**/MF **A01**
California Univ., Davis. Radiobiology Lab.
Annual Report, 1978-1979.
Oct 79, 260p
Contract EY-76-C-03-0472

Research efforts are directed toward contributing pertinent knowledge for safe and effective utilization of energy in our society. Our research program emphasizes research on mechanisms of effects and quantification of possible late effects from low-level exposure to radiation or from other agents by

the use of appropriate biologic test systems. Our interest includes the measurement of exposure and dose and delineation of their possible relationships to health consequences, such as tumors and shortening of lifespan. The effects of exposure in sensitive systems, which include the hematopoietic tissues, gonads, bone, lung, thyroid, and liver, are of particular interest. Basic studies on relevant primary metabolic mechanisms are included. The mission of the Laboratory includes, as an important aspect, the definition of sensitive segments of the test population and the more sensitive of tissue systems within individuals. Appropriate utilization of animal models provides a valid basis for extrapolating information derived in the Laboratory toward the goal of achieving more effective protection for man. Studies on mechanisms and assessment of affects employ a multidisciplinary approach and include expertise in molecular biology, biophysics, physiology, cellular biology, immunology, toxicology, oncology, radiologic dosimetry, analytical chemistry, and biochemistry. These studies assist in the evaluation of long-term, low-level effects by use of either simulated or real emissions from single or multiple sources of nuclear or fossil fuel energy-related pollutants. (ERA citation 05:012594)

UCRL-82501 PC **A02**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Mahalanobis Distance and Variable Selection to Optimize Dose Response.
D. H. Moore, II, D. E. Bennett, A. J. Wyrobek, and D. Kranzler. 29 May 79, 22p
Contract W-7405-ENG-48

A battery of statistical techniques are combined to improve detection of low-level dose response. First, Mahalanobis distances are used to classify objects as normal or abnormal. Then the proportion classified abnormal is regressed on dose. Finally, a subset of regressor variables is selected which maximizes the slope of the dose response line. Use of the techniques is illustrated by application to mouse sperm damaged by low doses of x-rays. (ERA citation 05:012623)

UCRL-82655 PC **A02**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Polyurethane as a Base for a Family of Tissue Equivalent Materials.
R. V. Griffith. 1980, 6p CONF-800304-7
Contract W-7405-ENG-48
International congress of the International Radiation Protection Association, Jerusalem, Israel, 8 Mar 1980.

Polyurethane was used as a base material for a wide variety of tissue simulating applications. The technique in fabrication is similar to that of epoxy, however, the end products are generally more flexible for use in applications where flexibility is valuable. The material can be fabricated with relatively small laboratory equipment. The use of polyurethane provides the dosimetrist with the capability of making specific, accurate, on-the-spot tissue equivalent formulations to meet situations which require immediate calibration and response. (ERA citation 05:012793)

UCRL-82658 PC **A02**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Systematic Approach to Personnel Neutron Monitoring.
R. V. Griffith, and D. E. Hankins. 1980, 9p CONF-800304-8
Contract W-7405-ENG-48
International congress of the International Radiation Protection Association, Jerusalem, Israel, 8 Mar 1980.

NTA film and albedo detectors represent the major portion of personnel dosimeters now used for occupational neutron monitoring. However, recent attention to the spectral response of these systems has demonstrated the need for detectors that have a better match to the fields being monitored. Recent developments in direct recoil track etch dosimeters present some intriguing alternatives, and careful use of exp 237 Np fission fragment detectors offers the advantage of a good dose equivalent spectral match. Work continues on a number of other new detector mechanisms, but problems with sensitivity, energy response, gamma interference, etc., continue to prevent development of most mechanisms into viable personnel dosimeters. Current dosimeter limitations make a systematic approach to personnel neutron monitoring particularly important. Techniques have been developed and tested, using available portable survey instruments, that significantly improve the quality of dosimeter interpretation. Even simple spectrometry can be done with modest effort, significantly improving the health physicists ability to provide accurate neutron monitoring. (ERA citation 05:012794)

UCRL-82679 PC **A02**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Dosimetry of Criticality Accidents Using Activations of the Blood and Hair.
D. E. Hankins. 1980, 5p CONF-800304-5
Contract W-7405-ENG-48
International congress of the International Radiation Protection Association, Jerusalem, Israel, 8 Mar 1980.

The evaluation of the dose that a person received in a criticality accident can be difficult. Most accidents have occurred when the person was not wearing nuclear accident dosimetry and since the NRC no longer requires these dosimeters, future dose evaluations may have to be based on body activations and gamma-to-neutron dose ratios. To aid in a dose evaluation we have compiled in a table the results from numerous criticality accident studies using 10 different critical assemblies, each with different neutron leakage spectra. There are several problems involved in applying these results accurately, the most significant problem being the determination of the configuration of the fissile material at the time of the accident. Other problems include a lack of information concerning the location, orientation, and possible shielding between the person and the accident assembly. (ERA citation 05:012607)

6S. Stress Physiology

AD-A082 451/6 PC **A03**/MF **A01**
Naval Ocean Systems Center San Diego CA
A Simple Method for Predicting Subjective Response to Noise on Navy Ships.
Technical document Apr-Oct 79,
D. R. Lambert. 15 Nov 79, 32p Rept no. NOSC/TD-296
Includes envelope with graph.

A graphical method of data analysis is presented for predicting response of shipboard personnel to airborne noise when compartment type and sound level are specified. To illustrate application of the method, the author used the subjective responses of personnel rate stateroom noise aboard eight U.S. Naval ships on a 5-point scale ranging from satisfactory to unsatisfactory. These ratings were then plotted as a function of A-weighted sound level and three parameters were estimated. Graphs for predicting subjective ratings from level were then constructed. (Author)

AD-A082 519/0 PC **A02**/MF **A01**
Office of Naval Research London (England)
Current Perspectives in Hyperbaric Physiology, Ultrasonic Doppler Bubble Detection, and Mass Spectrometry,
B. G. D'Aoust. 28 Dec 79, 15p Rept no. ONRL-R-5-79

Two important analytical techniques in biomedical research have been increasingly utilized in hyperbaric physiology over the past 12 years. Doppler ultrasonic bubble detection on the one hand and mass spectrometry on the other have been used to demonstrate responses to both elevated pressure and decompression which have previously been only conjecture. Both techniques have raised controversies, yet both, properly used, are capable not only of resolving them but also resolving many of the questions which have remained unanswered. The article discusses the 'state-of-the-art' of these two techniques in hyperbaric medicine and some of the more promising areas for the future. (Author)

AD-A082 606/5 Not available NTIS
Florida Univ Gainesville Dept of Physiology
The Role of Hormones in the Responses of Homeotherms to Cold,
Melvin J. Fregly. 1979, 10p
Contract N00014-68-A-0173-0007
Availability: Pub. in Comparative Mechanisms of Cold Adaptations, p159-168 1979 (No copies furnished by DTIC).

No abstract available.

AD-A082 617/2 PC **A03**/MF **A01**
Air Force Academy CO
Problems Associated with Meaningful Research on the Effects of Hyperbaric Oxygen on Mycotic Disease Agents.
Summary rept.,
William J. Cairney. Feb 80, 36p Rept no. USAFA-TR-80-4

The effect of hyperbaric oxygen on microorganisms has been investigated over the last 60 years. While work on bacteria has been careful and systematic, work on fungi has been less critical, often yielding conflicting results. An extensive review of the literature was undertaken to define problems associated with meaningful research on the effects of high oxygen pressures on the growth and development of certain human pathogenic fungi. Problem areas defined were significant variability and contradiction of available data; possible erroneous correlations of susceptibility of certain fungi taxa to inhibition by hyperbaric oxygen; questionable reliability of results of past work stemming from possible misidentification of organisms; nomenclatural controversies involving major human pathogenic fungal groups; and questionable reproducibility of certain studies due to the tendencies of certain fungi to change with time and conditions. (Author)

AD-A082 696/6 Not available NTIS
Defence and Civil Inst of Environmental Medicine Downsview (Ontario)
Steady-State Model of Lockout Submersible and Crew Thermal Requirements,
L. A. Kuehn, T. J. Smith, and D. G. Bell. 1975, 10p Rept no. DCIEM-PUB-75-RP-1110
Availability: Pub. in Underwater Physiology, v6 p123-132 1975 (No copies furnished by DTIC).

No abstract available.

AD-A082 699/0 Not available NTIS
Defence and Civil Inst of Environmental Medicine Downsview (Ontario)
Energy Expenditure and Work Stress of Divers Performing a Variety of Underwater Work Tasks,
D. G. Bell, and G. R. Wright. 16 Jan 78, 12p Rept no. DCIEM-TR-77X55
Availability: Pub. in Ergonomics, v22 n3 p345-356 1979 (No copies furnished by DTIC).

No abstract available.

AD-A082 700/6 Not available NTIS
Defence and Civil Inst of Environmental Medicine Downsview (Ontario)
Thermal Measurements on Divers in Hyperbaric Helium-Oxygen Environments,
L. A. Kuehn, and J. Zumrick. Nov 77, 19p Rept no. DCIEM-PUB-77X50
Availability: Pub. in Undersea Biomedical Research, v5 n3 p213-231 Sep 78 (No copies furnished by DTIC).

No abstract available.

AD-A082 871/5 Not available NTIS
Defence and Civil Inst of Environmental Medicine Downsview (Ontario)
Effect of Cold Exposure on the Metabolism of Immunoglobulins in Rabbits,
Brian H. Sabiston, and John E. M. Ste. Rose. 7 Aug 75, 8p Rept no. DCIEM-75-RP-1113
Availability: Pub. in The Jnl. of Immunology, v116 n1 p106-111 Jan 76 (No copies furnished by DTIC).

No abstract available.

AD-A082 908/5 Not available NTIS
Defence and Civil Inst of Environmental Medicine Downsview (Ontario)

Changes in the Single-Breath Nitrogen Washout Curve on Exposure to 17,600 Feet,
G. W. Gray, D. M. McFadden, C. S. Houston, and A. C. Bryan. 7 Nov 74, 7p Rept no. DCIEM-74-RP-1071
Availability: Pub. in Jnl. of Applied Physiology, v39 n4 p652-656 Oct 75 (No copies furnished by DTIC).

No abstract available.

AD-A082 909/3 Not available NTIS
Defence and Civil Inst of Environmental Medicine Downsview (Ontario)
Effect of Altitude Exposure on Platelets,
G. W. Gray, A. C. Bryan, M. H. Freedman, C. S. Houston, and W. F. Lewis. 7 Nov 74, 6p Rept no. DCIEM-75-RP-1094
Availability: Pub. in Jnl. of Applied Physiology, v39 n4 p648-651 Oct 75 (No copies furnished by DTIC).

No abstract available.

AD-A082 911/9 Not available NTIS
Defence and Civil Inst of Environmental Medicine Downsview (Ontario)
Spectral Analysis of Doppler Ultrasonic Decompression Data,
K. Kisman. 17 Aug 76, 6p Rept no. DCIEM-PUB-77X32
Availability: Pub. in Ultrasonics, p105-110 May 77 (No copies furnished by DTIC).

No abstract available.

AD-A082 993/7 PC **A02**/MF **A01**
Naval Air Development Center Warminster PA Aircraft and Crew Systems Technology Directorate
Live Subject Ejection Tower Testing to Determine Human Tolerance to an Increased Onset Rate of Acceleration.
Final rept. Jun 70-Oct 72,
W. C. Ward, Jr. 31 Oct 79, 22p Rept no. NADC-79244-60

The U.S. Navy development of an advanced Minimal Envelope/Weight (MEW) ejection seat under the auspices of AIR-340, Naval Air System Command (NASC), had as one of its design goals the development of a pure rocket motor as the propulsion system. The finalized propulsion unit produced an acceleration onset of 500/G/sec which exceeded the specification maximum onset rate of 250 G/sec. As a consequence, this study was generated to determine whether the higher onset in combination with a 10 to 12 G acceleration was physiologically acceptable. This report describes the tests conducted in exploration of physiological acceptability of this particular acceleration envelope. The results indicate successful tolerance based on limited exposure of four volunteer subjects. (Author

N80-21015/6 PC **A02**/MF **A01**
National Aeronautics and Space Administration, Washington, DC.
Adrenocortical Response in Rats Subjected to a Stress of Restraint by Immobilization Whether Accompanied by Hypothermia or Not.
L. Buchel, M. Prioux-guyonneau, and L. Libian. Apr 80, 10p NASA-TM-76119
Contract NASW-3198
Transl. Into English from Compt. Rend. Soc. Biol. (France), V. 168, No. 10-12, 1974 p 1202-1207. Transl. By Scientific Translation Service, Santa Barbara, Calif.

The restraint associated with hypothermia which increases the adrenal activity in rats was investigated. In rats with nomothermia or light hypothermia, the plasma and adrenal corticosterone levels increase at least threefold whatever the duration of restraint. Their return to normal values depends on the duration of the restraint. Exposure to cold produces in free rats a light hypothermia with an increase of the plasma and adrenal corticosterone levels, and in restraint animals an important hypothermia which does not potentiate the stimulation of adrenocortical activity induced by the restraint alone.

N80-21016/4 PC **A02**/MF **A01**
National Aeronautics and Space Administration, Washington, DC.
Reduction of the Duration of Restraint for the Production of Experimental Ulcers in Rats: Application to the Study of Protective Substances.
L. Buchel, and D. Gallaire. Apr 80, 7p NASA-TM-76136
Contract NASW-3198
Transl. Into English from Compt. Rend. Soc. Biol. (France), V. 157, No. 6, 1963, p 1225-1228. Transl. By Scientific Translation Service, Santa Barbara, Calif.

An experiment is described which was designed to cause ulcers in rats, but requiring less restraint time than previously used procedures. The method and results are presented.

N80-21020/6 PC **A02**/MF **A01**
National Aeronautics and Space Administration, Washington, DC.
Atherosclerotic Changes of Vessels Caused by Restriction of Movement.
G. S. Gvishiani, N. G. Kobakhidze, M. G. Mchedlishvili, and T. I. Dekanosidze. Mar 80, 7p NASA-TM-76022
Transl. Into English from Soobshch. Akad. Nauk Gruz. Ssr (USSR), V. 59, No. 3, 1970 p 701-704. Transl. By Kanner (Leo) Associates, Redwwod City, Calif.

The effect of restriction of movement on the development of atherosclerosis was studied in rabbits. Drastic restriction of movement for 20 and 30 days causes atherosclerotic alterations of the aorta and shifts in ECG which are characteristic of coronary atherosclerosis. At the same time, shortening of the duration of blood coagulation and an increase in the content of catecholamines and beta-lipoproteids occur.

N80-21021/4 PC **A02**/MF **A01**
National Aeronautics and Space Administration, Washington, DC.
Cold Shivering Activity after Unilateral Destruction of the Vestibular Apparatus.
G. I. Kuzmina. Mar 80, 11p NASA-TM-76099
Transl. Into English from Fiziol. Zh. SSSR (USSR), V. 65, No. 11, 1979 p 1655-1660. Transl. By Kanner (Leo) Associates, Redwood City, Calif.

The bioelectric activity of muscles (flexors and extensors of the forelimbs and hindlimbs) during cold shivering after unilateral destruction of the vestibular apparatus. It was found, that unilateral delabyrinthing produces bilateral facilitation of cold shivering in the flexor extremities more pronounced on the ipsilateral side. In the extensor muscles there was an absence of bioelectric activity both before and after delabyrinthing. Enhancement of cold shivering in the flexor extremities following intervention was evidently conditioned by removal of the inhibiting effect of the vestibulary apparatus on the function of special centers.

N80-21023/0 PC **A02**/MF **A01**
National Aeronautics and Space Administration, Washington, DC.
Coagulating Activity of the Blood, Vascular Wall, and Myocardium under Hypodynamia Conditions.
B. V. Petrovskiy, E. I. Chazov, and S. V. Andreyev. Mar 80, 10p NASA-TM-76056
Contract NASW-3199
Transl. Into English from the Book "Aktual Nyye Problemy Gemostaziologii, Molekulyarno-Biologicheskye I Fiziologicheskiye Aspekty" Moscow, Nauka Press, 1979 p 45-52. Transl. By Kanner (Leo) Associates, Redwood City, Calif.

In order to study the effects of hypodynamia on the coagulating properties of the blood, vascular wall, and myocardium, chinchilla rabbits were kept for varying periods in special cages which restricted their movements. At the end of the experiment, blood samples were taken and the animals were sacrificed. Preparations were made from the myocardium venae cavae, and layers of the aorta. Two resultant interrelated and mutually conditioned syndromes were discovered: thrombohemorrhagic in the blood and hemorrago-thrombotic in the tissues.

N80-21025/5 PC **A02**/MF **A01**
National Aeronautics and Space Administration, Washington, DC.
Effect of Space Flight on Sodium, Copper, Manganese and Magnesium Content in the Skeletal Bones.
A. A. Prokhonchukov, V. P. Taitsev, B. A. Shakhunov, V. A. Zhizhina, and A. G. Kolesnik. Oct 79, 11p NASA-TM-75506
Contract NASW-3199
Transl. Into English from Patol. Fiziol. Eksp. Ter. (USSR), No. 6, Nov. - Dec. 1978 p 65-70. Transl. By Kanner (Leo) Associates, Redwood City, Calif.

Sodium content decreased in the human skeletal bones and rose in the rat bones following space flight. In man copper content rose in the femoral bone and decreased in the vertebral body and the sternum, but was unchanged in the rest of the bones. Magnesium content was decreased in the femoral bone and the sternum, and in the vertebrae, but remained unchanged in the rest of the bones. Possible mechanisms of the changes detected are discussed.

N80-21026/3 PC **A02**/MF **A01**
National Aeronautics and Space Administration, Washington, DC.
Effects of Hypokinesia and Hypodynamia on the Intraorganic Arteries of the Heart.
L. A. Aleksina. Mar 80, 7p NASA-TM-76069
Contract NASW-3199
Transl. Into English from Arkh. Anat., Gistol. Embriol. (USSR), V. 61, No.11, 1971 p 92-95. Transl. By Kanner (Leo) Associates, Redwood City, Calif.

The experiments were performed on rabbits kept in small cages for 2-12 weeks. Their motor activity was greatly restricted. The arteries of the heart were injected with an India ink-gelatine mass; injection was directly into the coronary arteries. After fixation in 10% formaline solution 120 micron sections were cut. These were cleared by the Malygin method and examined with a light microscope. After exposure to hypokinetic conditions the picture of the cardiac arterial bed changed. During the first weeks the capillaries of the myocardium were significantly constricted, their course becoming sinuous. With prolonged exposure to hypokinetic conditions the vessels were found to dilate gradually and myocardial architectonics changed.

PB80-810310 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Aircraft Sonic Boom: Biological Effects. 1964-April, 1980 (Citations from the NTIS Data Base).
Rept. for 1964-Apr 80,
Elizabeth A. Harrison. May 80, 89p
Supersedes NTIS/PS-79/0190 and NTIS/PS-78/0120.

The selected abstracts of research reports cover the effects of sonic booms on humans, animals, birds, and fish. Discussions of biophysics, psychoacoustics, stress, and auditory tolerances are presented, along with materials on startle responses, disturbance, and compression wave reactions. (This updated bibliography contains 82 abstracts, 1 of which is a new entry to the previous edition.)

PB80-810526 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Hypothermia. 1964-May, 1980 (Citations from the NTIS Data Base).
Rept. for 1964-May 80,
Elizabeth A. Harrison. May 80, 258p
Supersedes NTIS/PS-79/0533 and NTIS/PS-78/0517.

The selected abstracts cover high pressure narcosis, organ preservation, hyperbaric conditions, thermal homeostasis, thermoregulation, cold stress, cold tolerance, physiological effects and cold water immersion as related to hypothermia. (This updated bibliography contains 250 abstracts, 12 of which are new entries to the previous edition.)

6T. Toxicology

AD-A082 437/5 PC **A03**/MF **A01**
Water and Air Research Inc Gainesville FL

A Summary and Evaluation of Aquatic Environmental Data in Relation to Establishing Water Quality Criteria for Munitions-Unique Compounds. Part 2. Nitroglycerin.
Final rept. 1 Apr 77-31 Aug 78,
J. H. Sullivan, Jr., H. D. Putnam, M. A. Keirn, B. C. Pruitt, Jr., and J. C. Nichols. Apr 79, 50p
Contract DAMD17-77-C-7027
See also report dated Oct 78, AD-A060 767.

The purpose of this report is to review the effects of nitroglycerin (TNG) on the aquatic environment and to recommend water quality criteria for the protection of aquatic organisms. Chemical properties, analytical methods, manufacturing wastewater characteristics, and environmental fate of TNG are reviewed and discussed. Three procedures were utilized to determine the recommended water quality criteria for TNG; (1) a new proposed procedure by EPA; (2) acute toxicity values multiplied by a general application factor; and (3) acute toxicity values multiplied by an experimentally derived application factor. Considering the results of these three procedures and the data from the chronic studies, a water quality criteria for TNG of 0.01 mg/1 (24-hour average) was recommended.

AD-A082 459/9 PC **A07**/MF **A01**
SRI International Menlo Park CA
Evaluation of the Occupational Health Hazards of Nitroglycerin Using Mammalian Models.
Final rept. 29 Jun 76-30 Nov 78,
James V. Dilley. Jan 79, 134p
Contract DAMD17-76-C-6068

A system was designed and constructed to allow monitoring of (a) blood flow in the coronary artery by the use of Doppler flow probes and (b) ventricular pressure by the use of implantable pressure transducers. The information is transmitted via implanted FM transmitters to external receivers, where the signal is processed and transformed to calibrated pressure and flow on a strip-chart recorder. This technique was used to measure the effects of inhaled or percutaneously administered nitroglycerin on coronary flow, left ventricular pressure, and ECG in dogs. The results indicated that the technique was valid for investigating whether nitroglycerin causes increased coronary flow and whether compensatory or reflex vasoconstriction occurs upon withdrawal. Our studies showed that dogs exposed to nitroglycerin by inhalation demonstrated those phenomena slightly, but that dogs treated percutaneously with 1.0 g of nitroglycerin daily did not show withdrawal symptoms. Indeed, the percutaneous treatment produced marginal changes in pressure and flow, slowing of the heart rate, and a progressive deterioration of the ECG patterns (T-wave inversion, arrhythmias diminished atrial beats, and preventricular contractions.) Studies on uptake of tritiated nitroglycerin confirmed that nitroglycerin was absorbed through the skin, but it could not be detected in the blood; however, di- and mononitroglycerins were detected in the blood. Following 10 days of daily treatment, the half-life of dinitroglycerins in blood was nearly doubled.

AD-A082 546/3 PC **A03**/MF **A01**
Rancho Los Amigos Hospital Downey CA
Studies on Oxygen Toxicity in the Lungs.
Final technical rept. 1 May 70-29 Feb 80,
Jack D. Hackney. 29 Feb 80, 50p
Contract N00014-78-C-0290

Work on two animal species has shown that during the first day of exposure to high concentrations of oxygen (O2), the normal rate of cell division in the lung is decreased. In animals that survive the initial exposure to O2 or in those exposed to a lower concentration, cell division resumes after about five days. In animals exposed to O2, it has been noted that they eat less and lose weight. Air-breathing mice deprived of food had weight loss and depression in DNA synthesis similar to that observed in mice exposed to 95 percent O2. These results indicate that indirect factors are associated with the depression of DNA synthesis observed in mice exposed to high O2. Lack of food or 40 percent O2 did not inhibit type 2 division associated with repair of ozone damaged alveolar epithelium. Oxygen concentrations of 61 percent or higher did inhibit reparative cell division in ozone damaged alveoli of mice.

AD-A082 685/9 MF **A01**
Litton Bionetics Inc Kensington MD
Mammalian Toxicological Evaluation of DIMP and DCPD.
Final rept. on Phase 2,
E. Ross Hart. Mar 80, 531p
Contract DAMD17-77-C-7003
See also report dated Nov 76, AD-A058 323.
Availability: Microfiche copies only.

Specially purified samples of DIMP proved nonmutagenic. About 90% of administered DIMP is recoverable from the urine of rats, mice or dogs and 95% of this is in the form of isopropyl-methyl-phosphonic acid (IMPA). No teratologic effects were produced by dietary levels of 100 to 3000 ppm given on days 6 through 15 of gestation. Dietary incorporation of DIMP at levels of 300 and 3000 ppm produced no dose-related reproductive response in the rat over three successive generations with two matings per generation. Nerve fiber degeneration (demyelination) in chickens treated once at 1500 mg/kg or twice at 1000 or 500 mg/kg. No toxic effects were seen over a 90-day period in beagles given dietary mixes containing 150, 1500 or 3000 ppm or DIMP. Purified DCPD proved non-mutagenic. No teratologic effects were observed in rats given dietary levels of 80, 250 or 750 ppm on days 6 through 15 of gestation. No deleterious effects on reproductive processes were seen with two matings per generation. No important evidence of toxicity was seen in beagles given 100, 300 or 1000 ppm in their diet over a 90 day period. (Author)

AD-A082 789/9 Not available NTIS
Defence Standards Labs Maribyrnong (Australia)
The Venom and Venom Apparatus of the Marine Gastropod Conus striatus Linne,
Shirley E. Freeman, R. J. Turner, and S. R. Silva. 29 May 74, 8p
Availability: Pub. in Toxicon, v12 p587-592 1974 (No copies furnished by DTIC).

No abstract available.

AD-A082 824/4 PC **A11**/MF **A01**
Battelle Columbus Labs OH
Mammalian Toxicological Evaluation of p-Chlorophenyl Methyl Sulfide, p-Chlorophenyl Methyl Sulfoxide, and p-Chlorophenyl Methyl Sulfone.
Final rept. 1 Jul 77-31 Oct 79,
Daryl C. Thake, Dennis Mays, Philip Leber, Diane Metcalf, and Lalitkumar Bavda. Jul 79, 244p
Contract DAMD17-77-C-7038

The purpose of this project was to determine the toxic potential of p-chlorophenyl methyl sulfide, sulfoxide and sulfone. Studies included in this report are: (1) acute oral LD50 in mice and rats, (2) acute dermal toxicity in rats, (3) skin irritation in rabbits, (4) eye irritation in rabbits, (5) skin sensitization in guinea pigs, (6) 28-day feeding studies in rats and mice, (7) 28-day gavage studies in rats, (8) 91-day feeding studies in rats and mice with interim sacrifices and 14-day reversibility studies, (9) 14-day gavage studies in rhesus monkeys with 14-day reversibility studies, (10) metabolism and pharmacokinetic studies, (11) Ames bacterial mutagenesis studies, (12) hexobarbital sleep time studies for microsomal enzyme induction. Death was achieved in the dermal toxicity studies only at the highest dosage level (5630 mg/kg). Results of the skin irritation studies in rabbits showed no irritation for sulfide, mild irritation for sulfone and sulfoxide. Sulfone induced no eye irritation in rabbits, while sulfide induced mild corneal responses which were reversible. Sulfoxide produced positive responses in cornea, iris, and conjunctiva, with the corneal opacity persisting throughout the 21-day observation period. None of the 3 compounds demonstrated unequivocal skin sensitization in guinea pigs. None of the 3 compounds were mutagenic in the Ames assay. Pathologic changes which were observed in this study included hepatic megalocytosis with syncitial cell formation and hepatic necrosis all of which occurred in both mice and rats given each of the 3 compounds.

AD-A082 913/5 Not available NTIS
Materials Research Labs Ascot Vale (Australia)
Chemical Modification of the Haemolytic Activity of Extracts from the Box Jellyfish Chironex fleckeri (Cnidaria),
H. D. Crone. 22 Sep 75, 11p
Availability: Pub. in Toxicon, v14 p97-107 1976 (No copies furnished by DTIC).

No abstract available.

BNL-50964 PC **A02**/MF **A01**
Brookhaven National Lab., Upton, NY.
Trifluoroethanol.
S. Siiberstein. Oct 78, 20p
Contract EY-76-C-02-0016

Fluorinol-50 and -85 (containing 50 and 85 mole % trifluoroethanol (TFE), respectively) are candidate working fluids for truck and power plant Diesel bottoming cycles, respectively. TFE is self-extinguishing and chemically stable at its proposed operating temperature. Toxic effects were not seen in production workers at Halocarbon Products Corp., the manufacturer, but are apparent in animal studies. The most obvious effects upon acute or chronic inhalation exposure are intoxication, narcosis, and death, but there is wide disagreement on concentrations producing nervous system effects. Ethanol is an antidote. Sterility and impaired spermatogenesis were first noted at 50 ppM in male rats. These changes may be reversible. Exposure of female rats to 10 ppM produced enlarged ovaries. Functional tests of reproductive ability were not done, but they should be, since the above concentrations are not much higher than the recommended threshold limit value, 2.5 ppM. Skin contact with TFE can cause nervous system effects and even death; eye contact produces corneal opacity. Because of TFE's ability to penetrate intact skin, the Toxic Materials Advisory Committee of the US Department of Energy strongly recommended that a less toxic working fluid be sought. We fully concur. It is unknown whether TFE will add to the danger of truck accidents, but leakage of the small amount of TFE used probably will not contaminate drinking water. (ERA citation 05:012656)

BNL-51043 PC **A03**/MF **A01**
Brookhaven National Lab., Upton, NY.
Health Effects of Coal in the National Energy Plan.
S. C. Morris, K. M. Novak, and L. D. Hamilton. Apr 79, 30p
Contract EY-76-C-02-0016

Estimates were made of the health damage from coal production and use (industrial and utility) expected under the President's National Energy Plan (NEP) for 1985 and 1990. These were compared with estimates of health damage in 1975 from coal combustion and from associated activities such as transportation. With population growth taken into account, the increase in disease and accidents in underground mining is about 70% between 1975 and 1985 and an additional 20% to 1990; this reflects an increase in the fraction of the total population exposed to this high risk activity. Health damage attributable to air pollution from coal combustion at utility and industrial plants is potentially large compared with health damage elsewhere in the fuel cycle. In comparing such estimates, note that, for air pollution, the uncertainty is much greater and the population at risk is generally much larger than for occupational risks, so that the individual risk is much lower. Despite increased coal use, sulfate exposure levels in 1985 are projected to decrease because of air pollution controls on both new and old plants. By 1990, SO sub 2 emissions from utility and industrial coal combustion will have climbed back above 1975 levels, and sulfate exposure levels also will have increased but not yet reached 1975 levels. This difference seems to be attributable to changes in population distribution. The bulk of the sulfate exposure in 1985 and 1990 clearly will come from pre-1975 plants. (ERA citation 05:012664)

CONF-791002-3 PC **A02**/MF **A01**
Argonne National Lab., IL.
Effect of Reaerosolized Fly Ash from an Atmospheric Fluidized Bed Combustor on Murine Alveolar Macrophages.
P. C. Brennan, F. R. Kirchner, and W. P. Norris. 1979, 18p
Contract W-31-109-ENG-38
19. annual Hanford life sciences symposium, Richland, WA, USA, 22 Oct 1979.

Male B6CF sub 1 mice were exposed to reaerosolized fly ash. The fly ash was collected from the

final filter of an atmospheric pressure fluidized-bed coal combustor and reaerosolized from a liquid nitrogen suspension. In four short experiments, (30-36 hrs; 6 hrs/day for 5-6 days) the fly ash was a composite of both start-up and steady-state material. In another experiment of longer duration (100 hrs; 6 hrs/day over a 4-week period), the fly ash used consisted of material from only steady-state operation of the combustor. Fly ash collected during steady-state operation is about 10 times less mutagenic in the Ames Salmonella test than is fly ash collected during start-up operation of the combustor. Mice exposed to fly ash in the short experiments showed a 2 to 4 fold increase in the number of alveolar macrophages 4 days after exposure and these macrophages were full of engulfed particles when examined by light microscopy. In in vitro tests 4-26 days after this exposure, macrophages from mice were unable to kill a challenge dose of Staphylococcus aureus as effectively as those from control mice. There was impairment in both phagocytic ability and in intracellular killing. Macrophages from mice exposed for 100 hrs to fly ash collected during steady-state operation were similarly full of engulfed particles when examined 4 days after exposure. However, the ability of these macrophages to kill S. aureus was unimpaired at this time and six months after exposure. These early observations suggest that the presence of mutagenic material on fly ash impairs the ability of macrophages to phagocytize and kill a challenge dose of S. aureus. (ERA citation 05:012657)

CONF-791002-4 PC **A03**/MF **A01**
Argonne National Lab., IL.
Interlaboratory Comparison of Mutagenesis Testing of Coal Fly Ash Derived from Different Coal Conversion Technologies.
C. Chrisp, C. Hobbs, R. Clark, and H. E. Kubitschek. 1979, 38p
Contract W-31-109-ENG-38
19. annual Hanford life sciences symposium, Richland, WA, USA, 22 Oct 1979, Portions of document are illegible.

This experiment showed that mutagenicity of fly ash derived from different coal conversion technologies, as determined by the Ames plate incorporation test, was similar in all three laboratories. The differences in mutagenic activity of each fly ash between laboratories with different solvent extraction methods were no greater than one order of magnitude. In addition, there were much smaller, but still significant differences in mutagenic activity between laboratories when the same solvent extract of a particular fly ash was tested in each laboratory. There were also significant differences in mutagenicity of the positive control mutagen (maximum of fivefold) between laboratories. Because of this difference in Ames test sensitivity between laboratories, the influence of the solvent extraction methods on differences in mutagenicity was not clear. However, the data suggested that either there were significant differences in the degree of sensitivity of Ames tests for different complex mixtures within each laboratory, or else there were differences in mutagen extraction efficiency between different solvent extraction methods. Both Ames test sensitivity and solvent extraction may be important. Further work would be necessary to separate the contribution of these two factors. An important aspect of further work would be to separate the contribution of the innate sensitivity of substrains of Ames tester strains in each laboratory from the possible effects of differences in Ames testing methodology. This could be done by testing the same extracts of fly ash and positive control mutagens with substrains of tester strains exchanged between laboratories. This work also implies that caution should be exercised in assuming that the same solvent would have the same efficiency for extraction of mutagens from different fly ashes even within the same laboratory. (ERA citation 05:012647)

EPRI-WS-78-110 PC **A06**/MF **A01**
Sigma Research, Inc., Richland, WA.
Proceedings: Advisory Workshop on Carcinogenic Effects of Coal Conversion.
D. H. Pack. Sep 79, 120p CONF-7809189-
Advisory workshop on carcinogenic effects of coal conversion, Pacific Grove, CA, USA, 26 Sep 1978.

The technical papers, research recommendations, and conclusions of a workshop on carcinogenic effects of coal conversion are presented. Attention at this workshop was restricted to effects in the work place itself rather than effects on the general populace. Thus, the workshop dealt with plant-related matters such as sampling methods and sample handling, coal conversion processes, and experience with pilot plant operation. Methods of evaluating chemicals for carcinogenicity, including in vitro and in vivo testing and epidemiology, are covered in the discussion, technical papers, and recommendations. Some 59 research suggestions made at the workshop were distilled by the attendees to 18 specific research and development program recommendations in areas of industrial hygiene, medical surveillance, and epidemiology. (ERA citation 05:012667)

LA-UR-79-2737 PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
Flow Cytometric Analysis of Respiratory Tract Cells Exposed to Oil Shale and Silica Particulates.
J. A. Steinkamp, and J. S. Wilson. 1979, 19p
CONF-791002-1
Contract W-7405-ENG-36
19. annual Hanford life sciences symposium, Richland, WA, USA, 22 Oct 1979.

Flow cytometric techniques were used to measure the cytological and biochemical damage to respiratory tract cells in animals exposed to particulates. Hamsters were exposed to raw and spent oil shale particulates and silica by intratracheal instillation. Exfoliated lung cells were obtained by sacrificing the animals and lavaging the respiratory tract posterior to the trachea with saline. Cell samples were fixed in ethanol and stained with mithramycin for fluorescence analysis of DNA content. DNA content distributions from hamsters exposed to spent oil shale and silica particulates showed atypical changes 28 to 35 days later. Cell counts and total numbers of macrophages, leukocytes, and epithelial cells in the lavage fluid also showed marked changes related to time after exposure. (ERA citation 05:005006)

LA-8063-MS PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
Effects of Arsenic, a Toxic Oil Shale Constituent, on Cell Proliferation and Histone Phosphorylation.
L. R. Gurley, R. A. Walters, J. H. Jett, and R. A. Tobey. Dec 79, 17p
Contract W-7405-ENG-36

Because of the casual association between arsenic and cancer in man, studies were initiated to determine if subtoxic levels of arsenic have effects on cell proliferation and chromatin constituents. Cultured CHO cells were treated with both As(III) and As(V), as sodium arsenite (NaAsO sub 2) and sodium arsenate (Na sub 2 HAsO sub 4), respectively, to assess their biological impact. Quantitatively, arsenite was ten times more toxic than arsenate, with 5 x 10 exp -5 M arsenite causing irreversible inhibition of culture growth. At subtoxic concentrations, 10 exp -5 M NaAsO sub 2 induced culture growth kinetics that caused a cell division delay period followed by a spontaneous recovery of cell division. During this division delay, histone HI phosphorylation was reduced to 40% of control. It then recovered to control levels just before recovery of cell division. Histone H2A phosphorylation was stimulated in the middle of the division delay period, followed by a stimulation of H3 phosphorylation just before recovery of cell division. The DNA synthesis rate was also reduced during division delay, but it did not recover before resumption of cell division. The ATP pool levels were unaffected at these low arsenite concentrations. Flow microfluorometric analysis demonstrated that cell-cycle progression was inhibited throughout the entire cycle during the division delay period. Upon recovery of cell division, cells in S and G sub 2 regained the capacity to resume cycle traverse earlier than did cells in G sub 1 . These results support the conclusions that interphase HI phosphorylation is not tightly coupled to DNA synthesis, but is vitally involved in cell-cycle progression. The results indicate that sodium arsenite modulates those histone phosphorylations involved with cell proliferation. (ERA citation 05:014370)

LA-8099-MS PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
In Vitro Mutagenicity Testing. II. Silastic 386 Foam Elastomer, Irganox 1010, Mixture of Sylgard 184 with Encapsulating Resin and Curing Agent, and Dimethylbenzanthracene.
S. Y. Wang, and D. M. Smith. Feb 80, 6p
Contract W-7405-ENG-36

Four materials, Silastic 386 Foam Elastomer, Irganox 1010, Sylgard 184 with Encapsulating Resin and Curing Agent, and 7,12-dimethylbenzanthracene (DMBA), were tested for in vitro mutagenicity by the Ames Salmonella assay method. Silastic 386 Foam Elastomer, Irganox 1010, and Sylgard 184 Encapsulating Resin with Curing Agent were not mutagenic; the mutagenicity of DMBA was corroborated. (ERA citation 05:014377)

PB80-167042 PC **A04**/MF **A01**
National Bureau of Standards, Washington, DC.
Carbonaceous Aerosol Generator for Inhalation Studies.
Final rept. Feb 78-Apr 79,
Thomas G. K. Lee, and George W. Mulholland. Feb 80, 53p EPA-600/1-80-014

A carbonaceous aerosol generator designed for inhalation experiments with animals is described. The aerosol produced from a modified diffusion flame has a concentration of 3-10 mg/cu. m. at a flow rate of 30 L/min. The addition of a small amount of O2 to the acetylene fuel greatly increased the efficiency of fuel to particulate conversion, the maximum value was 2.5%. The aerosol size characteristics were: Dgn = 0.14 micro m., based on the electrical aerosol analyzer; approximately 0.08 micro m., based on a low pressure inertial impactor; mediam elementary particle approximately 0.023 micro m. and mediam agglomerate particle approximately 0.54 micro m., based on transmission electron microscopy. The size characteristics of the generated aerosol are compared with diesel exhaust based on available published data.

PB80-167232 PC **A04**/MF **A01**
State Univ. of New York Downstate Medical Center, Brooklyn.
Establishment of a Laboratory for the Evaluation and Measurement of Cholera Toxin, Antitoxins and Toxoids.
Final rept. 1 Oct 77-31 Jan 79,
John P. Craig. Jul 79, 70p DAB-VDP-01-80
Contract N01-AI-0-2091

The purpose of this contract has been to establish a facility to provide essential tools needed in the search for improved immunizing agents against cholera and related diarrheas. The specific activities carried out under this contract have been: (1) measurement of the activity of the following materials by the vascular permeability method in rabbit skin: cholera toxin; cholera antitoxin; antitoxin-binding activity of non-toxic derivatives of cholera toxin molecules, such as cholera toxoid, or toxin subunits; and standardization of all of the above materials against reference preparations. (2) measurement of the toxic activity of cholera toxins, the immunogenicity of cholera toxin and the protective capacity of cholera antitoxic sera in mice; (3) determine the in vitro toxin producing capacity of strains of cholera vibrios using the assays described in (1) above.

PB80-169428 PC **A03**/MF **A01**
Duke Univ. Medical Center, Durham, NC. Dept. of Pathology.
Development of an in vitro Model for Screening Organophosphates for Neurotoxicity (Pilot Study).
Final rept. 1 Oct 78-30 Sep 79,
Doyle G. Graham. Feb 80, 43p EPA-600/1-80-016
Contract EPA-68-02-2953

An in vitro model utilizing neuroblastoma cell lines was developed for the differentiation of organophosphorus compounds which have the potential for induction of delayed degeneration of peripheral nerves and the spinal cord. IMR-32 neuroblastoma cells, derived from a human tumor, showed specific (3H)-norepinephrine uptake. The greater effect of alkyl over aryl OP compounds suggests a relationship with water solubility, thus equilibrium between adsorption to agar and the surrounding

medium or lysosomal contents. The effect of parathion was intermediate, less than that for merphos, DEF and EPN but greater than that for leptophos and TOCP. Electron microscopic observations suggest further studies to define a morphologic lesion peculiar to the clinically delayed neurotoxic OP compounds.

PB80-169568 PC **A07/MF A01**
MITRE Corp., McLean, VA. METREK Div.
Health Effects Research Program. Summary Report for Fiscal Years 1974-1978,
Richard D. Thomas, Alexis D. Taylor, and Judith G. Gordon. Dec 79, 149p MTR-79W00100, EPA-600/7-79-121
Contract EPA-68-01-5051
See also PB-284 265.

The Federal Interagency Energy/Environment Research and Development Program which is coordinated by the U.S. Environmental Protection Agency was initiated in the latter half of fiscal year 1974 to ensure that health and environmental problems related to energy resource development would be anticipated and evaluated. This document provides an overview of the Interagency-supported health effects research program from an administrative as well as various technical perspectives. In this updated program review, which is based on the individual task progress reports available for fiscal years 1974 through 1978, the research projects are reviewed and discussed according to King-Muir objectives and selected scientific discipline, biological endpoint, and agent/pollutant categories.

PB80-169865 Not available NTIS
International Agency for Research on Cancer, Lyon (France).
IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Humans, Some Monomers, Plastics and Synthetic Elastomers, and Acrolein. Volume 19.
Feb 79, 502p ISBN-92-832-1219-3
See also PB-290 230.
Available from Franklin Institute Press, Benjamin Franklin Parkway, Philadelphia, PA 19103 ($35.00).

The objective of the program is to elaborate and publish in the form of monographs critical reviews of data on carcinogenicity for groups of chemicals to which humans are known to be exposed, to evaluate these data in terms of human risk with the help of international working groups of experts in chemical carcinogenesis and related fields, and to indicate where additional research efforts are needed. The monographs summarize the evidence for the carcinogenicity of individual chemicals and other relevant information. The critical analyses of the data are intended to assist national and international authorities in formulating decisions concerning preventive measures. No recommendations are given concerning legislation, since this depends on risk-benefit evaluations, which seem best made by individual governments and/or international agencies. In this connection, WHO recommendations on food additives(3), drugs(4), pesticides and contaminants(5) and occupational carcinogens(6) are particularly informative.

PB80-169873 Not available NTIS
International Agency for Research on Cancer, Lyon (France).
IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Humans, Some Halogenated Hydrocarbons. Volume 20.
Oct 79, 591p ISBN-92-832-1220-7
See also PB-290 230.
Available from Franklin Institute Press, Benjamin Franklin Parkway, Philadelphia, PA 19103 ($35.00).

The objective of the program is to elaborate and publish in the form of monographs critical reviews of data on carcinogenicity for groups of chemicals to which humans are known to be exposed, to evaluate these data in terms of human risk with the help of international working groups of experts in chemical carcinogenesis and related fields, and to indicate where additional research efforts are needed. The monographs summarize the evidence for the carcinogenicity of individual chemicals and other relevant information. The critical analyses of the data are intended to assist national and international authorities in formulating decisions concerning preventive measures. No recommendations are given concerning legislation, since this depends on risk-benefit evaluations, which seem best made by individual governments and/or international agencies. In this connection, WHO recommendations on food additives(3), drugs(4), pesticides and contaminants(5) and occupational carcinogens(6) are particularly informative.

PB80-170400 PC **A06/MF A01**
Raltech Scientific Services, Inc., Madison, WI.
Adriamycin Cardiotoxicity: A Comparison with Adriamycin Analog NSC Number 233853.
Final rept. 24 Jan-21 Sep 78,
J. Will, G. Splitter, J. Lalich, S. Dennis, and W. Dennis. 28 Feb 79, 123p 43746-09, RSS-233853-1979-09
Contract N01-CM-4-3746

Adriamycin analog NSC no. 266210 was not as cardiotoxic as its parent compound when injected for a twelve week period. This conclusion is based on histologic, hematologic, serum enzyme and electrocardiographic studies. The analog failed to produce, in most test animals, renal toxicity, myeloid suppression or myocardial toxicity. Animals receiving NSC no. 266210 had lengthened survival and did not lose weight when compared with animals treated with Adriamycin.

PB80-170517 PC **A07/MF A01**
Raltech Scientific Services, Inc., Madison, WI.
Adriamycin Cardiotoxicity: A Comparison with 7-omen-7(R)-o-methylnogarol (NSC no. 269148).
Final rept. 14 Mar-15 Nov 78,
J. Will, G. Splitter, J. Lalich, S. Dennis, and W. Dennis. 21 Mar 79, 138p 43746-10, RSS-269148-1979-10
Contract N01-CM-4-3746
Prepared in cooperation with Wisconsin Univ.-Madison.

Adriamycin analog NSC no. 269148 was less cardiotoxic than its parent compound. This conclusion is based on histologic, hematologic, serum enzyme and electrocardiographic studies. The analog produced much less renal toxicity, myeloid suppression or myocardial toxicity than adriamycin. Animals receiving NSC no. 269148 had lengthened survival and did not lose weight when compared with animals treated with adriamycin.

PB80-176050 PC **A04/MF A01**
National Inst. for Occupational Safety and Health, Cincinnati, OH. Div. of Criteria Documentation and Standards Development.
Criteria for a Recommended Standard - Occupational Exposure to Furfuryl Alcohol.
Criteria document,
Terence M. Grady. Mar 79, 72p DHEW/PUB/NIOSH-79-133
Prepared in cooperation with Equitable Environmental Health, Inc.

This report reviews available scientific and technical information on furfuryl alcohol and recommends a standard for the control of furfuryl alcohol hazards in the workplace. The acute hazards include eye, skin, and upper respiratory irritation from direct contact and depression of the central nervous system from inhalation or percutaneous absorption. Evidence of a chronic effect is not available. Other hazards associated with the compound include combustibility and violent reactivity when mixed with acids. About 9,000 workers are potentially exposed to furfuryl alcohol in the United States, and about 100 million pounds are produced and used each year. Its main use is in the synthesis of furan resins, which are used in such operations as the binding of foundry core sand. In the absence of data indicating that the existing permissable limit is not protective, the standard proposed to the U.S. Department of Labor contains recommendations for continuation of the present Federal limit of 200 mg/cu m as a time-weighted average concentration and also for a program of medical and environmental surveillance.

PB80-176076 PC **A12/MF A01**
National Inst. for Occupational Safety and Health, Cincinnati, OH. Div. of Criteria Documentation and Standards Development.
Criteria for a Recommended Standard - Occupational Exposure to Ketones.
Criteria document,
Burt J. Cooper. Jun 78, 255p DHEW/PUB/NIOSH-78-173
Prepared in cooperation with SRI International, Menlo Park, CA.

The National Institute for Occupational Safety and Health (NIOSH) evaluates all available research data and criteria and recommends standards for occupational exposure. The Secretary of Labor will weigh these recommendations along with other considerations, such as feasibility and means of implementation, in promulgating regulatory standards. NIOSH will periodically review the recommended standards to ensure continuing protection of workers and will make successive reports as new research and epidemiologic studies are completed and as sampling and analytical methods are developed. The views and conclusions expressed in this document, together with the recommendations for a standard, are those of NIOSH. They are not necessarily those of the consultants, the reviewers selected by professional societies, or other Federal agencies. However, all comments, whether or not incorporated, were considered carefully and were sent with the criteria document to the Occupational Safety and Health Administration for consideration in setting the standard.

PB80-176092 PC **A03/MF A01**
National Inst. for Occupational Safety and Health, Cincinnati, OH. Div. of Criteria Documentation and Standards Development.
Revised Recommended Standard - Occupational Exposure to Ethylene Dichloride (1,2 Dichloroethane).
Criteria document.
Sep 78, 38p DHEW/PUB/NIOSH-78-211

NIOSH considers the evidence of carcinogenicity of ethylene dichloride reported by the National Cancer Institute to be conslusive in two mammalian species (the rat and the mouse). Since ethylene dichloride causes progressive, malignant disease of various organs in two species of animals, NIOSH recommends that ethylene dichloride be considered carcinogenic in man. Therefore, because it is not presently possible to establish an exposure level at which ethylene dichloride may be regarded to be without risk, NIOSH recommends that exposure to ethylene dichloride be kept as low as feasible. The use of ethylene dichloride as a solvent, diluent, or fumigant in open operations should be prohibited. Product substitution should be a paramount consideration, and wherever ethylene dichloride is identified or its presence suspected, it should be replaced by a less harmful substitute.

PB80-177314 PC **A06/MF A01**
Environmental Protection Agency, Washington, DC. Office of Pesticides and Toxic Substances.
Directory of Federal Coordinating Groups for Toxic Substances, Second Edition.
Toxics Integration Information series,
Judy Colle, and Kathryn A. Slike. Mar 80, 109p EPA-560/13-80-008
See also PB80-137870.

This directory was compiled to provide a ready reference about Federal toxic chemical coordinating groups. Included are committees, task forces, and other groups that perform coordinating functions in conjunction with Federal toxics control and testing agencies.

PB80-810302 PC **N01/MF N01**
National Technical Information Service, Springfield, VA.
Methods in Carcinogen Bioassay. 1970-April, 1980 (Citations from the NTIS Data Base).
Rept. for 1970-Apr 80,
Elizabeth A. Harrison. May 80, 233p
Supersedes NTIS/PS-79/0316 and NTIS/PS-78/0300.

The bibliography cites selected references on methods in animal bioassay for determining carcinogenicity. Chemicals, such as drugs, insecticides, and food additives have been assayed in laboratory rats and mice. The route of exposure has been through ingestion. The majority of the references cited are from the National Cancer In-

stitute, Carcinogenesis Program. (This updated bibliography contains 226 abstracts, 63 of which are new entries to the previous edition.)

UCID-18222-79-1 PC **A02**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Sperm Shape Abnormalities Induced by Energy-Related Hydrocarbons and Industrial Chemicals. Progress Report, January 1-June 30, 1979.
A. J. Wyrobek. 23 Jul 79, 13p
Contract W-7405-ENG-48

Using existing and new biological screening and testing systems, the presence of carcinogenic, mutagenic, teratogenic and physiologic or metabolically toxic agents associated with coal and oil shale extraction, conversion or utilization was identified. The purpose of the study is to further develop and apply the detection of morphologically abnormal mammalian sperm as a rapid, simple, quantitative assay of the pathologic response of the male gonad to toxic agents associated with the recovery, process stream, and emission of nonnuclear sources of energy, with primary attention to substances from in situ coal gasification and in situ oil-shale extraction. Changes in mouse sperm head dimensions following low dose x-ray exposure have been compiled and analyzed. (ERA citation 05:014386)

UCID-18316 PC **A02**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Toxicity of Oil Shale Retort Water to Representative Aquatic Fishes. Progress Report.
F. L. Harrison, R. Berger, and R. R. Ireland. 1 Nov 79, 20p
Contract W-7405-ENG-48

The sensitivity of fathead minnow and rainbow trout embryos to oil shale retort water was investigated using static and flow-through bioassays. The continuous renewal of toxicant provided by the flow-through system resulted in mortalities at lower concentrations than in the static system; for the fathead minnow the LC50 sub 12 was 0.08% in the flow-through and 0.14% in the static bioassay. Embryos of rainbow trout were more resistant to the toxicant than those of the fathead minnow. The incipient lethal concentration in the static bioassay system was between 0.4 and 0.2% for trout embryos and between 0.2 and 0.1% for the fathead minnow embryos. The response of fathead minnow embryos to toxicant changed with age. The most sensitive period appears to be about 24 to 30 hours after spawning when the embryos are undergoing rapid differentiation of the nervous and circulatory systems. Also performed were histochemical tests for the lysosomal enzymes beta -glucuronidase and beta -glucosamididase. These are ready to be applied to fishes exposed to low levels of oil shale retort water to determine whether sublethal effects on lysosomal structure have occurred. Experiments need to be performed to separate the toxicological effects of the inorganic from the organic constituents of the oil shale retort water and to compare the toxicity of oil shale retort water from different burns. We propose to use the fathead minnow embryo bioassay to obtain this information. (ERA citation 05:013117)

UCRL-15093 PC **A04**/MF **A01**
Reference Dynamics, Santa Rosa, CA.
State-of-the-ART Review of the Behavioral Toxicology of Hydrogen Sulfide.
P. J. Vigil. Aug 79, 58p
Contract W-7405-ENG-48

This report provides a state-of-the-art review of the behavioral toxicology of hydrogen sulfide. The effects on humans from chronic, low-level exposures are the primary concern, although acute, subacute, animal and in vitro studies are included to provide an overview of the biological activity of hydrogen sulfide. Recommended research is also addressed to resolve issues which are not conclusive in the literature. (ERA citation 05:012674)

UR-3490-1776 PC **A06**/MF **A01**
Rochester Univ., NY. Dept. of Radiation Biology and Biophysics.
Renal Effects of Inhaled Carbon Tetrachloride and the Influence of Inhaled Isopropanol: A Comparison with the Hepatic Effects.
E. C. Henry. 1979, 108p
Contract EY-76-C-02-3490
Thesis.

These experiments suggest that direct interaction of CC1 sub 4 in the kidney leading to a toxic response via the peroxidative mechanism proposed for its hepatotoxicity probably does not occur in rats and mice. Although the kidney does contain lipid peroxidizable in vitro, renal metabolism of CC1 sub 4 initiating membrane lipid peroxidation as monitored by loss G-6-Pase activity cannot be detected in vivo following exposures which cause severe peroxidation in liver. Like liver, kidney tissue contains P-450 activity which is inducible and other data in the literature indicate its possible importance in mediating renal toxicity of some agents. However, the results of our experiments are more consistent with the hypothesis that renal effects of CC1 sub 4 are secondary to the more severe response in liver. (ERA citation 05:012663)

7. CHEMISTRY

7A. Chemical Engineering

COO-2907-30 PC **A11**/MF **A01**
Institute of Gas Technology, Chicago, IL.
Study of the Behavior of Gas Distribution Equipment in Hydrogen Service. Final Report, April 1, 1976-December 31, 1978.
D. G. Johnson, and W. J. Jasionowski. Apr 79, 233p
Contract EY-76-C-02-2907

The results of this 2-3/4 year program show that no special maintenance or safety constraints are necessary when dry, pure hydrogen is carried in modern, well-maintained piping systems composed of conventional natural gas distribution components. Volumetric flow metering requirements were identified as the only significant operational problem. When the normal condition of turbulent or partially turbulent flow exists, our model distribution loops showed energy delivery for hydrogen to be at least 80% that of natural gas under the same operating conditions. Several general and important conclusions are stated below. Natural gas (or methane) leak rates are roughly equivalent to hydrogen leak rates on an energy basis (e.g. Btu/hour). Hydrogen exposure at the moderate temperatures and pressures encountered in the experimental gas distribution models did not create materials problems or related safety problems. However, there was a measurable change in the physical properties of plastic pipe, some adhesives, and some lubricants. Due to the threefold increase in volumetric flow rate of hydrogen required for equivalent natural gas energy delivery rates, existing meters may be undersized due to mechanical limitations and affect metering accuracy and lifetime. Test data are inconclusive, but gas flow metering accuracy, even within rated meter capacity, may be less with hydrogen than with natural gas when employing conventional metering equipment. Meters may have to be replaced for hydrogen service. Throttling of hydrogen at conventional pressure regulating stations or as a result of major leaks does not create conditions conducive to large temperature rises due to Joule-Thomson heating. Thus the potential safety hazard of autoignition of hydrogen, due to throttling does not exist under gas distribution operating conditions. (ERA citation 05:011408)

DOE/EV-10287(Dr) PC **A22**/MF **A01**
SRI International, Menlo Park, CA.
Environmentally Based Siting Assessment for Synthetic-Liquid-Fuels Facilities. Final Report.
Jan 80, 507p
Contract AC03-79EV10287

A detailed assessment of the major environmental constraints to siting a synthetic fuels industry and the results of that assessment are used to determine on a regional basis the potential for development of such an industry with minimal environmental conflicts. Secondly, the ability to mitigate some of the constraining impacts through alternative institutional arrangements, especially in areas that are judged to have a low development potential is also assessed. Limitations of the study are delineated, but specifically, the study is limited geographically to well-defined boundaries that include the prime coal and oil shale resource areas. The critical factors used in developing the framework are air quality, water availability, socioeconomic capacity, ecological sensitivity, environmental health, and the management of Federally owned lands. (ERA citation 05:012910)

DOE/FE-2210-1 PC **A11**/MF **A01**
Batteile Columbus Labs., OH.
Connected Block and Effective Conductivity (CONBEC) Computer Program to Predict Heat Flow Through Multicomponent Refractory Lined Gasifier Vessel Walls. Users Manual.
G. R. Whitacre, and I. M. Grinberg. Jan 80, 235p
Contract EX-76-C-01-2210

CONBEC is a computer programmed model which determines the steady-state heat flow through multicomponent refractory-lined gasifier vessel walls. The model accounts for the effects of lining thickness, porosity, gaps, cracks, refractory composition, physical form, anchor spacing and configuration, gas pressure and composition, and other parameters on heat flow. CONBEC is based on a combination of the CONnected Block and Effective Conductivity techniques. The refractory wall is described as a series of blocks, each with its own effective thermal conductivity. The connected blocks are used to handle nonlinear temperature effects, material difference, and location effects. Parallel heat flow paths through the wall are used to provide for distinct material changes, gaps, conductivity changes, and hot-spot determination. The typical configuration has two parallel heat flow paths. Anchors can be treated as a separate heat flow path or can be left out. The blocks are cross-linked to account for lateral heat flow between the parallel paths. The model is extremely simple to use yet it provides considerable information regarding the importance of material, design, and operational parameters on heat flow in refractory vessel walls and on hot spots. It was developed to be used in the design of material systems for coal gasification vessels and has broad applicability to other refractory linings for furnaces or process vessels.The output results of CONBEC are in good agreement with experimental data obtained for several refractory material systems over a range of wall temperatures, gas compositions, wall thicknesses, crack and gap characteristics, and gas pressures. (ERA citation 05:012911)

DOE/JPL/954334-10 PC **A16**/MF **A01**
Union Carbide Corp., New York.
Low Cost Solar Array Project. Feasibility of the Silane Process for Producing Semiconductor-Grade Silicon. Final Report, October 1975-March 1979.
Jun 79, 365p
Contract NAS-7-100-954334

The commercial production of low-cost semiconductor-grade silicon is an essential requirement of the JPL/DOE (Department of Energy) Low-Cost Solar Array (LSA) Project. A 1000-metric-ton-per-year commercial facility using the Union Carbide Silane Process will produce molten silicon for an estimated price of $7.56/kg (1975 dollars, private financing), meeting the DOE goal of less than $10/kg. Conclusions and technology status are reported for both contract phases, which had the following objectives: (1) establish the feasibility of Union Carbide's Silane Process for commercial application, and (2) develop an integrated process design for an Experimental Process System Development Unit (EPSDU) and a commercial facility, and estimate the corresponding commercial plant economic performance. To assemble the facility design, the following work was performed: (a) collection of Union Carbide's applicable background technology; (b) design, assembly, and operation of a small integrated silane-producing Process Development Unit (PDU); (c) analysis, testing, and comparison of two high-temperature methods for converting pure silane to silicon metal; and (d) determination of chemical reaction equilibria and kinetics, and vapor-liquid equilibria for chlorosilanes. (ERA citation 05:013256)

DOE/JPL/954334-11 PC **A03**/MF **A01**
Union Carbide Corp., New York.

Low Cost Solar Array Project: Experimental Process System Development Unit for Producing Semiconductor-Grade Silicon Using the Silane-to-Silicon Process. Quarterly Progress Report, April-June 1979.
1979, 30p
Contract NAS-7-100-954334

The overall objective of the LSA Silicon Material Task is to establish a chemical process for producing silicon at a rate and price commensurate with the production goals of the LSA project for solar-cell modules. This material must be suitable for utilization in the large-area sheet process and in the automated process for the fabrication of solar cells. As part of the overall Silicon Material Task, Union Carbide developed the silane-silicon process and advanced the technology to the point that it has a definite potential for providing high-purity polysilicon on a commercial scale at a cost of $14/kg by 1986 (1980 dollars). The Phase III program (initiated in April 1979) is aimed at establishing the practicality of the process by pursuing the following specific objectives: (1) design, fabricate, install, and operate an Experimental Process System Development Unit (EPSDU) sized for 100 MT/Yr to obtain extensive performance data to establish the data base for the design of commercial facilities; (2) perform supporting research and development to provide an information base usable for the EPSDU and for technological design and economic analysis for potential scale-up of the process; and (3) perform iterative economic analyses of the estimated product cost for the production of semiconductor-grade silicon in a facility capable of producing 1000 MT/Yr. The three basic process steps entail converting M-G silicon to trichlorosilane, redistributing the trichlorosilane to produce silane, and thermally decomposing the silane to form polycrystalline silicon powder. The powder is then melted and the molten silicon is cast into rods for subsequent fabrication of solar cells. Technical progress is reported. (ERA citation 05:013257)

DOE/JPL/954334-9 PC **A05**/MF **A01**
Union Carbide Research Inst., Tarrytown, NY.
Low Silicon Solar Array Project. Feasibility of Low-Cost, High-Volume Production of Silane and Pyrolysis of Silane to Semiconductor-Grade Silicon. Quarterly Progress Report, October-December 1978.
W. C. Breneman, E. G. Farrier, and H. Morihara. 1978, 95p
Contract NAS-7-100-954334

Research on silane production in a hydrogenation reactor is described. The kinetics and chemical equilibrium for the liquid phase disproportionation of H sub 2 SiCl sub 4 and HSiCl sub 3 were studied and results are presented and discussed. Status of the studies on the feasibility and cost of manufacturing semiconductor grade polycrystalline silicon by the pyrolysis of silane in a fluid bed reactor and in a free space reactor is reported. Process design, the waste disposal system, and equipment specifications for the fluid bed pyrolysis of silane for silicon production are described. (ERA citation 05:013255)

DOE/JPL/954343-79/16 PC **A03**/MF **A01**
Lamar Univ., Beaumont, TX. Dept. of Chemical Engineering.
Process Feasibility Study In Support of Silicon Material, Task 1. Quarterly Technical Progress Report (XVI), June-August, 1979.
K. Y. Li, K. C. Hansen, and C. L. Yaws. Sep 79, 45p
Contract NAS-7-100-954343

During this reporting period, primary efforts were expended on process system properties, chemical engineering and economic analysis. Analysis of process system properties was continued for silicon source materials under consideration for producing silicon. The following property data are reported for dichlorosilane which is involved in processing operations for silicon: critical constants, vapor pressure, heat of vaporization, heat capacity, density, surface tension, thermal conductivity, heat of formation and Gibb's free energy of formation. The properties are reported as a function of temperature to permit rapid engineering usage. Major efforts were expended on completion of the preliminary economic analysis of the BCL Process (Battelle Columbus Laboratories). Cost analysis results for the process (Case A-two deposition reactors and six electrolysis cells) are presented based on a preliminary process design of a plant to produce 1000 metric tons/year of silicon. Fixed capital investment estimate for the plant is $12.47 million (1975 dollars) ($17.47 million, 1980 dollars). Product cost without profit is %8.63 $/kg of silicon (1975 dollars) (12.1 $/kg, 1980 dollars). (ERA citation 05:013258)

DOE/JPL/954862-7 PC **A02**/MF **A01**
AeroChem Research Labs., Inc., Princeton, NJ.
Development of a Model and Computer Code to Describe Solar Grade Silicon Production Processes. Seventh Quarterly Report, April 1-June 30, 1979.
R. Srivastava, and R. K. Gould. Aug 79, 18p
AeroChem-TN-207
Contract NAS-7-100-954862

This program aims at developing mathematical models and computer codes based on these models, which allow prediction of the product distribution in chemical reactors for converting gaseous silicon compounds to condensed-phase silicon. The major interest is in collecting silicon as a liquid on the reactor walls and other collection surfaces. Two reactor systems are of major interest, the Westinghouse SiCl sub 4 /Na reactor in which Si(l) is collected on the flow tube reactor walls and the new AeroChem reactor in which Si(l) droplets formed by the SiCl sub 4 /Na reaction are collected by a jet impingement method. During this quarter the following tasks have been accomplished: (1) particle deposition routines have been added to the boundary layer code and (2) Si droplet sizes in SiCl sub 4 /Na reactors at temperatures below the dew point of Si are being calculated. Initial results from the latter show that droplet sizes in such reactors are predominantly in the range 0.2 to 1.0 mu m. Such particles are too small to collect by conventional means (e.g., cyclones) but should be easily collected by very high velocity impaction at reduction pressures such as that being examined by AeroChem. (ERA citation 05:013265)

DOE/TIC-11067 PC **A02**/MF **A01**
West Virginia Univ., Morgantown. Dept. of Industrial Engineering.
Computerized Decision Analysis for Atmospheric Fluidized Bed Coal Combustion Process.
A. K. Mallik, J. W. Byam, Jr., and T. Yang. 1979, 16p

This paper deals with the development of a computerized economic evaluation model for after-tax analysis of capital and operating costs related to Fluidized-Bed Coal Combustion technology which is a new technology for the efficient burning of high sulfur coal while satisfying current EPA emission standards. Using this evaluation model, the economics of the Fluidized-Bed combustion system are compared with conventional coal burning processes for generating steam. This paper discusses the general usage of the computerized economic analysis model, while a computerized cost engineering model is being developed to estimate capital and operating costs of the Fluidized-Bed Coal Combustion system under certain specified conditions. (ERA citation 05:013035)

EPRI-AF-1189 PC **A05**/MF **A01**
Rockwell International, Canoga Park, CA. Rocketdyne Div.
Coal Slurry Feed Pump for Coal Liquefaction. Phase II. Final Report.
G. S. Wong. Sep 79, 81p

Using the materials selection and system concept developed in Phase I, the contractor has completed the detailed design of a slurry feed pump for commercial size coal liquefaction plants. The pumping design requirements were 5000 gpm, 3000 psi, at 550 exp 0 F. The pump design uses erosion resistant materials in a structurally strong casing. The system concept incorporates features for rapid maintenance and involves multiple modules of identical paired stages. Each pair of stages is set back to back to minimize thrust. The modules are driven by a single motor or turbine with multiple drive shafts. The deliverables by the contractor include a hydraulic design, thermal analysis, and structural analysis plus a complete set of detail drawings. Also included are the manufacturing and test plans for fabrication of the pump. The complete mechanical design of the prototype pump including an assembly drawing with seventy detail drawings, parts lists, and specifications was completed. Because of the proprietary nature of the detailed design, the drawings and manufacturing plan are not included in the final report but are available to authorized invididuals through EPRI. (ERA citation 05:011084)

FE-1207-T17 PC **A02**/MF **A01**
Bituminous Coal Research, Inc., Monroeville, PA.
Gas Generator Research and Development BI-GAS Process. Economics of Gasifier Effluent Recycle Gas to Stage I of a BI-GAS Pilot Plant.
Oct 79, 17p
Contract EF-77-C-01-1207

The BI-GAS gasifier is designed such that its lower region (Stage I) is the combustion zone where oxygen and steam contact and react with recycled char. One of the problems encountered has been the safe and efficient combustion of char. Since there does not exist a reliable solids flow measurement device capable of withstanding high pressure (1500 psig max) high temperature (800 exp 0 F) operation in this particular char feed system, oxygen feed cannot be regulated with any degree of accuracy. Steady combustion cannot therefore be assured. When combustion experts were asked to evaluate this situation, they felt comfortable that reignition of char in Stage I (the lower combustion zone of a two-stage, entrained-bed, ash slagging gasifier) would occur. They did fear, however, detonation or temperature excursions in Stage II of the gasifier (the upper coal devolilization zone) if coal combustion was initiated. Their recommendation therefore was to maintain a supplemental fuel gas feed to the char burners to burn all of the oxygen feed until a reliable char flow measurement device was developed and tested. That development work is under way. This report presents an economic analysis of various recycle gas supplemental fuels in comparison to a study done by C.F. Braun which used no fuel gas addition to Stage I of the gasifier. The results indicate that, should a supplemental fuel be necessary to provide stable combustion and/or temperature control, a gasifier effluent recycle gas with all of the water, H sub 2 S, and carbon dioxide removed, would be the most economical choice.It would increase the final cost of the substitute natural gas by only 9.4%. Before a commercial plant is designed incorporating this recycle gas supplemental fuel, a further and more detailed economic evaluation should be performed. (ERA citation 05:011060)

FE-1207-T22 PC **A05**/MF **A01**
Bituminous Coal Research, Inc., Monroeville, PA.
Bi-Gas Pilot Plant Gasifier Operation Tests G-3 Through G-3G.
Oct 79, 92p
Contract EF-77-C-01-1207

This is the fourth of a series of operating reports to describe pilot plant activities, to present data and conclusions, and to make recommendations appropriate to that operation. This report focuses on the operation of the 2-stage, entrained-bed, high pressure (1500 psig max), oxygen blown, and ash slagging gasifier during eight separate tests (G-3 through G-3G). Subbituminous coal from the Rosebud seam of the Western Energy Company's mine at Colstrip, Montana, was fed to Stage II of the gasifier with Winfield limestone flux during each test. The specific objective of Tests G-3 through G-3G was to determine if slag tapping could be improved if limestone flux was added to the coal feed. Because they shared the same specific objective, Tests G-3 through G-3G were grouped together for presentation. Other objectives are described briefly. With the measures taken during these tests, the slag tapping problems of previous tests were largely overcome. The improved slagging could not be attributed solely to the addition of limestone flux: two other changes had also been made (reduction of water cooling near the tap hole and lengthening of the tap burner) and whether the improved tapping resulted from one or a combination of these changes could not be concluded. The ability to keep the tap hole open did permit tests of longer duration which thereby allowed more of the objectives to be attempted. Although slag tapping was significantly

improved, a number of other problems plagued gasifier operation. These included: inadequate solids flow measurement instrumentation, numerous involuntary burner shutdowns, buildups of slag in Stage II, and recurring damage to the burner which resulted in cooling water leaks in Stage I. (ERA citation 05:012916)

FE-1207-T8 PC **A03**/MF **A01**
Bituminous Coal Research, Inc., Monroeville, PA.
Gas Generator Research and Development, BI-GAS Process. BI-GAS Pilot Plant Gasifier Operation Tests G-7 and G-7A.
Oct 79, 48p
Contract EF-77-C-01-1207

The BI-GAS Pilot Plant, located in Homer City, Pennsylvania, is designed to study a new process for the conversion of coal to pipe-line quality gas. The BI-GAS process was developed through work performed by Bituminous Coal Research, Inc., under contract with the US Office of Coal Research. This is the eighth of a series of operating reports designed to describe pilot plant activities, present data and conclusions, and to make recommendations. This report focuses on the operation of the 2-stage, entrained-bed, high pressure (1500 psig max), oxygen blown, and ash slagging gasifier during two separate tests (G-7 and G-7A). Subbituminous coal from the Rosebud seam of the Western Energy Company's mine at Colstrip, Montana, was fed to Stage II of the gasifier during each test. The two tests were conducted between February 4th and February 25th, 1978, and included a total of only 17 hours of coal feed and 7.5 hours of char feed. Both tests were very sporadic, being plagued by cold weather which resulted in frozen process and sensing lines. Therefore, none of the overall objectives were achieved, but several specific conclusions can be drawn from the limited operation that was achieved. This series of tests was terminated when A char burner ruptured. The gasifier rapidly depressured through the rupture and a fire ensued. Extensive damage was sustained by the electrical wiring, controls, and insulation in the gasifier structure. Total damage was approximately $42,350 with repairs taking about five months.It is becoming increasingly apparent that a new char burner design is needed to eliminate the plugging tendencies, damaged burner faces, and premixing of fuel and oxygen, all of which have been experienced several times. (ERA citation 05:011055)

FE-1517-T68 PC **A13**/MF **A01**
Conoco Coal Development Co., Library, PA. Research Div.
Coal Liquefaction and Deashing Studies of the CSF and SRC Processes.
J. A. Kleinpeter, D. C. Jones, P. J. Dudt, F. P. Burke, and G. D. Rutledge. Nov 78, 297p
Contract EX-76-C-01-1517

Continuous bench-scale studies on the deashing of coal liquefaction products by gravity settling were conducted in a 10 lb coal/hour unit. The donor solvent Consol Synthetic Fuel (CSF) process and the Solvent Refined Coal (SRC) process were simulated. Steady-state liquefaction solvents were used to give as good a simulation as possible. The SRC data were used in a conceptual design for the solvent deashing unit of a commercial coal liquefaction plant. Anti-solvent (deasphalting or precipitating solvent) screening was done in a batch system before continuous runs using anti-solvent were made. Deashed CSF product contained 0.22 wt % ash; using anti-solvent did not improve settling efficiency. The upflow velocity of the settler was 0.3 in/min, which is about 25% of the value obtained in a previous study using non-steady-state liquefaction solvent. SRC with 0.1 wt % ash was produced using an anti-solvent/liquefaction solvent weight ratio of 0.3 to 0.5. The recovery of SRC was 85% in this single-stage operation. The upflow velocity was 0.4 in/min. Deashing was sensitive to the amount of Soltrol 130 (a paraffinic naphtha) used as anti-solvent. Equilibrium liquefaction solvent from the Ft. Lewis SRC pilot plant was used. Performance of the 10 lb/hr liquefaction reactor matched Ft. Lewis results. Moderate contamination of recycled Soltrol 130 significantly decreased the settling rate. Kauributanol value was a good indicaton of anti-solvent purity. A conceptual design of a two-stage solvent deashing unit for a commercial (20,000 TPSD) SRC plant shows that thirty-five 40' diameter primary settlers (600 exp 0 F, 77 psig) and twenty wash settlers (550 exp 0 F, 54 psig) of the same diameter are required to produce specification SRC (0.18% ash). The SRC recovery in the two-stage system is estimated at 97% of the entering SRC. (ERA citation 05:011040)

FE-2006-15 PC **A06**/MF **A01**
Utah Univ., Salt Lake City. Dept. of Mining and Fuels Engineering.
Applied Research and Evaluation of Process Concepts for Liquefaction and Gasification of Western Coals. Quarterly Progress Report, January-March 1979.
W. H. Wiser. Jul 79, 109p
Contract EX-76-C-01-2006

Progress to date is summarized. Hydrotreated SRC liquids undergo smooth catalytic cracking at 325 to 425 exp 0 C to yield light liquid products with little gas and coke formation. The cracking reaction can be controlled to yield gasoline-range products. Increasing the temperature of the carbon monoxide hydrogenation reaction over iron-manganese catalyst increased the olefin selectivity and reduced methane production. At constant conversion the olefin selectivity increased with increasing space velocity and decreased with increasing H sub 2 /CO ratio. The C sub 2 -C sub 4 hydrocarbon yield is insensitive to process changes at constant temperature and conversion. At constant temperature the olefin selectivity increased with increasing space velocity and decreased with increasing H sub 2 CO ratio. (ERA citation 05:012947)

FE-2247-24 PC **A03**/MF **A01**
Texaco, Inc., South El Monte, CA. Montebello Research Lab.
Gasification of Residual Materials from Coal Liquefaction. Type II Preliminary Pilot Plant Evaluations of SRC-II Vacuum Flash Drum Bottoms from Powhatan Coal.
A. M. Robin. Jul 79, 34p
Contract EX-76-C-01-2247

About 7 1/2 tons of SRC-II vacuum flash drum bottoms from the liquefaction of Powhatan coal were successfully gasified in a 12 ton per day pilot plant. The single fifteen hour run was completed at 24 atmospheres pressure. A 99.5 percent conversion of the carbon in the feed to syngas was achieved, yielding 33.4 SCF of dry syngas per pound of residue charged. The dry syngas contained about 90 (vol) percent carbon monoxide plus hydrogen. About three percent heavy distillate was added to the molten residue to reduce its viscosity to an acceptable level for handling in the pilot plant. Samples of all effluent streams were obtained and sent to Gulf Mineral Resources Company for detailed analyses. The short pilot plant run confirmed the operability of the Texaco Synthesis Gas Generation Process with this feedstock, and the data obtained confirm earlier predictions of performance efficiency. The run consisted of two Type II Preliminary Pilot Plant Evaluations run back to back, thus achieving a single run of twice the normal on stream time for a Type II Evaluation. (ERA citation 05:012920)

FE-2361-45(V.1) PC **A10**/MF **A01**
Hydrocarbon Research, Inc., Lawrenceville, NJ.
Development of Fast Fluid Bed Coal Gasification Process. Phase I, Volume 1. Final Report, July 1976-April 1979.
Jul 79, 215p
Contract EX-76-C-01-2361

The objective of this program, under Department of Energy Contract No. EX-76-C-01-2361, was to develop a coal gasification process for low Btu gas utilizing the principle of the fast fluid bed unit operation. The program encompassed four tasks: design, construction, operation and recommendations for further development. Program objectives were met within the contractual schedule. Cold flow fluid dynamic tests were conducted at City University of New York to provide a data base for the gasifier design. A cold test run initiated operation of the Fast Fluid Bed gasifier; three runs at design conditions followed. Two of the runs used anthracite feed coal and the third used Illinois No. 6, a caking coal. Gas production was achieved in all three runs - gas heating values of 130 Btu/SCF were reached in the Illinois coal run, and as high as 90 Btu/SCF were obtained during the anthracite operations. There were no plugging problems during any of these runs. In addition to low Btu gas, fast fluid bed technology can be used to generate medium Btu syngas (320 Btu/SCF) or high Btu gas (1000 Btu/SCF SNG), if desired. Perhaps its greatest technical and economic advantage is the production of low Btu gas for use in combination with advanced power cycles. While the fast fluid bed gasification concept is new, many of the basic concepts have been employed in other industries so that the prospects of successful development appear to be extremely high. (ERA citation 05:011064)

FE-2361-45(V.4) PC **A08**/MF **A01**
Hydrocarbon Research, Inc., Lawrenceville, NJ.
Development of a Fast Fluid Bed Coal Gasification Process. Volume 4. Appendix C. Run Data Summaries. Final Report.
Jul 79, 165p
Contract EX-76-C-01-2361

No abstract available.

FE-2434-45-T1 PC **A04**/MF **A01**
Institute of Gas Technology, Chicago, IL.
Pipeline Gas from Coal: Hydrogenation (IGT Hydrogasification Process). Project 70101 Quarterly Report No. 11, January 1-March 31, 1979.
Oct 79, 68p
Contract EX-76-C-01-2434

The objective of this project is to perform the necessary pilot plant operation and related support studies to acquire data for a commercial/demonstration plant design based on the HYGAS Process. Test 77 was terminated when it became apparent that no trucks would be able to deliver the nitrogen required for high-pressure operation. The reactor operated under self-sustained conditions for 708 hours and 237 tons of coal were fed. A great deal of useful information was obtained. Preparations for Test 78 were completed. The objective of this test was to explore the gasification behavior of ROM coal in the pilot plant at a 500-psig operating pressure, a superficial velocity ranging from 1 to 1.2 ft/s, and using steam feed without nitrogen dilution. Test 78 was concluded at 1000 hours, March 11, because of a leaking valve at the bottom of the feed slurry mix tank and solids transfer problems between the slurry dryer and the LTR in the gasifier. Significant experience was gained operating the coal-handling and pretreatment sections. The pilot plant was thoroughly inspected after Test 78 was ended. The plant was then cleaned and prepared for Test 79 operations. Pretreater and reactor data from Tests 72 and 73 are now available and are presented in this report. Construction work on the new 400-ton coal/char storage system was completed, and shakedown operations were begun. (ERA citation 05:012922)

FE-2434-49 PC **A05**/MF **A01**
Institute of Gas Technology, Chicago, IL.
Pipeline Gas from Coal: Hydrogenation (IGT Hydrogasification Process). Project 70101 Quarterly Report No. 12, April 1-June 30, 1979.
Oct 79, 79p
Contract EX-76-C-01-2434

The objective of Test 79 was to examine the gasification behavior of caking bituminous Illinois No. 6 run-of-mine (ROM) coal at a 500-psig reactor operating pressure. The reactor was to be operated under two sets of conditions to achieve char conversions ranging from 85% to 90%. The 400-ton coal/char storage system was used for the first time in Test 79. The test plan was to build up an inventory of pretreated char in the storage system, then heat the reactor and begin char feeding. The plan was executed successfully, and the stored char was used to cover any interruptions in the coal preparation or pretreatment sections. In this manner the reactor was fed at high rates continuously and smoothly in spite of the difficulties inherent in handling ROM coal. Coal crushing and sizing were initiated well in advance of anticipated reactor operation. A number of pilot plant modifications in preparation for Test 79 enhanced pilot plant operation, especially in the coal preparation and slurry preparation sections. The 400-ton coal/char storage system handled, stored, and delivered char easily, thus proving its capability of supporting reactor feeding operations in the long, smooth test

operation that followed. Test 79 was highly significant because it was the longest continuous, steady-state HYGAS test ever conducted with this ROM coal. Over 7-1/2 days of continuous feed and a 178-hour steady-state period were logged. Four hundred and sixty-eight tons of pretreated char were processed through the reactor. Reactor results from Tests 75, 76 and 77 are presented in the Appendix, along with overview plots of important reactor variables during these tests. (ERA citation 05:012923)

FE-2468-70 PC **A02**/MF **A01**
Engineering Societies Commission on Energy, Inc., Washington, DC.
ESCOE Engineering Program. Quarterly Report, September 1-November 30, 1979.
26 Dec 79, 21p
Contract EF-77-C-01-2468

ESCOE is conducting a technical evaluation of materials for energy technology, to prevent major materials and system failures, thereby improving plant operability, and developing materials standards and specifications for coal conversion and use processes. Staff conducted an evaluation of materials of construction for advanced power systems, the third and final, materials area to be examined under this task. A systematic technique is being developed for assessing the opportunities, constraints, costs and impacts associated with the conversion of oil- and gas-fired electric power plants in a single geographic region to coal or coal-derived fuels. The technique is being applied to the New England region. ESCOE is providing continuing support to the MIT effort to develop a complex coal conversion process design simulator assuring efficient coordination between government and private experts. ESCOE is reviewing DOE research and development projects on surface and underground mining to assess their technical feasibility and their region-by-region impact on mining costs and productivity. A comprehensive analysis of the greater use of coal to displace foreign petroleum identified constraints and initiatives and was used to develop a plan for the decade of the 90's that is technically feasible and economically viable. (ERA citation 05:012924)

FE-2547-39 PC **A05**/MF **A01**
Hydrocarbon Research, Inc., Lawrenceville, NJ.
Laboratory Program to Support H-Coal Pilot Plant Operations. PDU Run 7.
Aug 79, 80p
Contract EF-77-C-01-2547

PDU Run 7 was designed to create emergency situations under controlled conditions and develop the proper responses to reestablish operations with a minimum of disruption. In addition, the study served to train operating personnel to handle emergencies in the H-Coal Pilot Plant and to start up the new equipment which had been installed since the last PDU operations. The run also generated process optimization data for operations in the fuel oil mode using Illinois No. 6 coal. (ERA citation 05:011089)

FE-2566-30 PC **A04**/MF **A01**
UOP, Inc., Des Plaines, IL. Corporate Research Center.
Upgrading of Coal Liquids. Hydrotreating and Fluid Catalytic Cracking of EDS Process Derived Gas Oils. Interim Report.
F. J. Riedl, and A. J. deRosset. Aug 79, 54p
Contract EF-77-C-01-2566

The objective of this work was to evaluate the applicability of commercial UOP hydrotreating and fluid catalytic cracking (FCC) processes to distillate liquids derived from the Exxon Donor Solvent (EDS) process. Feedstocks were derived from the 400 to 1000 exp 0 F (204-538 exp 0 C) fraction of the new EDS product. Five different feedstocks, ranging in hydrogen content from 7.41 to 11.95 wt % were prepared by batch vacuum flash distillation or by catalytic hydrotreating in research pilot plants. Rerunning the raw feed to remove 18.7 wt % bottoms failed to eliminate heptane insolubles. Therefore, a UOP black oil conversion catalyst, known to be effective in reducing heptane insolubles, was selected for hydrotreating the raw stock. Results of fluid catalytic cracking in a research scale riser cracker unit showed that feed hydrogen content is a dominant factor in conversion and yield structure. Hydrotreating substantially improved the cracking characteristics of the EDS liquid product. As more hydrogen was added, conversion and gasoline yield increased and carbon deposition decreased. Gasoline research octane numbers of 95-101 were obtained. Cycle oils containing 650 exp 0 F exp - distillate as high as 85 vol % were generated. The lighter portions of the cycle oil, boiling between 400 to 650 exp 0 F, are valuable components of distillate fuels and heating oils. It is concluded that, with an appropriate degree of hydrotreatment, the EDS process derived gas oil, or any other coal derived distillate of similar quality, can be readily processed into high quality gasolines by applying advanced commercial fluid catalytic cracking technology. The fluid catalytic cracker, in conjunction with a hydrotreater, shows potential to play a major role in future commercial refining of coal derived liquids. (ERA citation 05:012952)

FE-2566-37 PC **A02**/MF **A01**
UOP, Inc., Des Plaines, IL. Corporate Research Center.
Upgrading of Coal Liquids. Monthly Technical Progress Report, December 1979.
F. J. Riedl, and A. J. deRosset. Jan 80, 14p
Contract EF-77-C-01-2566

Final results for fluid catalytic cracking (FCC) of SRC-II derived gas oils are reported. Results show an increase of conversion with increasing hydrogen content and temperature. Experimental work required under Task 2 of the contract is completed. (ERA citation 05:011090)

FE-2582-T1 PC **A04**/MF **A01**
Memphis Light, Gas and Water Div., TN.
Industrial Fuel Gas Demonstration Plant Program. Quarterly Progress Report, January-March 31, 1979.
1979, 72p
Contract EF-77-C-01-2582

The status of the U-GAS demonstration plant at Memphis is described: design, site selection and evaluation, environmental effects (management, schedule, water quality, hydrology, ecology, socio-economic factors, noise), permits, equipment license agreements, cost, etc. Recent pilot plant results are also described; extensive tables of data are included. (ERA citation 05:012926)

FE-2588-22 PC **A05**/MF **A01**
Amoco Oil Co., Naperville, IL. Research and Development Dept.
Study of Ebullated Bed Fluid Dynamics for H-Coal. Quarterly Progress Report No. 6, March 1-May 31, 1979.
I. A. Vasalos, E. M. Bild, D. N. Rundell, and J. W. Gorman. Jun 79, 98p
Contract EF-77-C-01-2588

The H-Coal process, developed by Hydrocarbon Research, Incorporated (HRI), involves the direct catalytic hydroliquefaction of coal to low-sulfur boiler fuel or synthetic crude oil. The H-Coal ebullated bed reactor contains at least four discrete components: gas, liquid, catalyst, and unconverted coal and ash. Because of the complexity created by these four components, it is desirable to understand the fluid dynamics of the system. The objective of this program is to establish the dependence of the ebullated bed fluid dynamics on process parameters. This will permit improved control of the ebullated bed reactor. The work to be performed is divided into three parts: review of prior work, cold flow model construction and operation, and mathematical modeling. The review of prior work has been completed. The objective of this quarterly progress report is to outline progress in the second and third parts of the project. (ERA citation 05:012953)

FE-2645-03 PC **A02**/MF **A01**
UOP, Inc., Des Plaines, IL. Corporate Research Center.
Deasphalting, Deashing, and Upgrading of Coal Liquids. Quarterly Technical Progress Report, April-June 1979.
F. J. Riedl, and A. J. deRosset. Jul 79, 23p
Contract ET-78-C-01-2645

Deashing of UOP coal liquefaction product, using the UOP Demex process, has been completed. Three rejection levels of 17, 30 and 26 wt % were attained. Ash content of the composite product was < 20 ppM. Fixed bed hydrotreating of the deashed oil was completed. A 0.75 wt % increase in hydrogen content was obtained under relatively mild operating conditions. A second coal liquefaction operation was completed, using the hydrotreated deashed oil as solvent. A 90 to 93 wt % (MAF basis) coal conversion was achieved. Demex deashing of this second liquefied coal product is to be started in July. (ERA citation 05:012954)

FE-2745-T1 PC **A05**/MF **A01**
Arizona Univ., Tucson. Dept. of Chemical Engineering.
Development of High-Pressure, Stirred, Near-Plug Flow Laboratory Reactor for Coal Liquefaction. Annual Report, August 15, 1977-August 14, 1978.
D. H. White. Jan 79, 89p
Contract EF-77-G-01-2745

The research in progress is developing a high-pressure, stirred, near-plug flow laboratory reactor, capable of handling more dense and more viscous slurries over a wider range of flow velocities than possible in the coventional unstirred tubular reactor. An existing plasticating extruder, complete with instrumentation and data logging by a minicomputer, was modified by adding pressure slurry feed, redesigning existing screws, and providing certain sampling and safety devices. The unique character of flow of the extruder was retained, namely, handling a dense slurry, generating pressures to more viscous liquids and slurries, providing internal mixing by the screw, and maintaining this flow in a near-plug condition as proven by its narrow residence time distribution (RTD). Data was taken upon the performance of the modified extruder for handling coal/oil slurries, including concentrations, pressure and temperature profiles along the screw, the RTD by radioactive tracer technique to determine the closeness of plug flow, the degree of internal mixing by RTD correlations and experiments on axial dispersions, and some laboratory rheological properties of the slurries utilized. Coal/gear oil slurry concentrations up to 60 weight percent coal were handled without difficulty. Recommendations were made upon the design of a laboratory reactor based upon these results. The reactor under development is unique in that it can handle concentrated coal slurries under high pressures in a mixed, near-plug flow condition. (ERA citation 05:012956)

FE-2778-12 PC **A04**/MF **A01**
Pullman Kellogg, Houston, TX.
Engineering Support Services for the DOE/GRI Coal Gasification Research Program. Quarterly Technical Progress Report, April-June 1979.
A. E. Dover, L. E. Bostwick, J. M. Gunderson, B. P. Castiglioni, and D. A. Hubbard. Aug 79, 72p
Contract ET-78-C-01-2778

Activities consisted of continued monitoring at the Hygas, Westinghouse, Rockwell and Exxon plant sites. Trip reports were issued on BI-GAS Test G-7A, Westinghouse run TP-020-1, and Hygas Test 79. Trips were made to observe parts of Hygas Test 80 and Westinghouse run TP-022-1. Trips were taken to the BI-GAS plant site to discuss items relating to safety. Meetings were held at Rockwell to discuss their plans and design work. A DOE/GRI Operating Committee meeting was held to discuss the Rockwell program. Monitoring of the Bell Aerospace process remains inactive while awaiting contract signing at DOE. Monitoring of the Peatgas work at IGT is being handled by telephone contact and by report review. Preliminary screening evaluation work continues on the Rockwell Hydrogasification, Exxon Catalytic and Westinghouse Fluid Bed processes. The safety assurance study continues on the BI-GAS, Exxon, Rockwell and Westinghouse processes. Consultations on the Westinghouse PDU continue. (ERA citation 05:012929)

FE-2806-4 PC **A07**/MF **A01**
Institute of Gas Technology, Chicago, IL.
Coal Gasification Pilot Plant Support Studies. Project 61015 Quarterly Report, January 1-March 31, 1979.
Sep 79, 143p

Contract ET-78-C-01-2806

Seven additional isothermal devolatilization tests were made in a coiled-tube reactor with a Colorado subbituminous B coal at temperatures ranging from 800 to 1400 exp 0 F in hydrogen and helium atmospheres at a total pressure of 500 psig. These tests showed a good agreement of CO and CO sub 2 yields with predicted values. To resolve the discrepancy in comparing heavy hydrocarbons (oils, tars, C/sub 3+/ exchuding C sub 6 H sub 6) yields with the model, a direct measurement technique was developed, employing two Porapak Q packed columns connected in series. Preliminary chromatographic analysis of the packed column contents identified 20 to 30 types of hydrocarbon compounds. Further data analysis is in progress. The analyses of previous thermobalance gasification data with lignite chars indicate that gasification can be broadly divided into (a) rapid-rate, (b) transient-rate, and (c) low-rate gasification reactions. The kinetic parameters, including the effect of inherent catalytic constituents, for Montana, North Dakota, and Darco lignites were estimated. Experimental work to determine the effect of the addition of calcium and sodium on the gasification of bituminous coals is in progress. Detailed thermodynamic analysis of the steam generation process steps in the HYGAS Design B11-s were conducted to identify the causes of efficiency losses. Further analyses are in progress to define the basis for the observed irreversibilities and to explore efficient process alternatives. Three other studies are reported. (ERA citation 05:011069)

FE-2893-29 PC **A13**/MF **A01**
Exxon Research and Engineering Co., Florham Park, NJ.
EDS Coal Liquefaction Process Development. Phase IV. Quarterly Technical Progress Report, January 1-March 31, 1979.
1979, 291p
Contract EF-77-A-01-2893
U.S. Sales Only.

This report is the sixth quarterly technical progress report for US Department of Energy Cooperative Agreement No. EF-77-A-01-2893 for Exxon Donor Solvent (EDS) Coal Liquefaction Process Development - Phase IV. This report covers the period January 1 through March 31, 1979. The Laboratory Process Research and Development studies were conducted at various Exxon Research and Engineering Co. (ER and E) facilities: Research and Development Division at Baytown, Texas, Products Research Division at Linden, New Jersey; and the Exxon Research and Development Laboratories at Baton Rouge, Louisiana. The Engineering Research and Development studies were performed at the Synthetic Fuels Engineering hand Exxon Engineering Technology Departments of ER and E at Florham Park, New Jersey. The information dealing with the Management, Detailed Engineering, and Procurement and Construction of the 250 T/D Exxon Coal Liquefaction Pilot Plant (ECLP) was generated at The Carter Oil Company, Houston, Texas, and Exxon Engineering - Project Management Department of ER and E, Florham Park, New Jersey. Highlights from this report are summarized. (ERA citation 05:011092)

FE-2893-35 PC **A22**/MF **A01**
Exxon Research and Engineering Co., Florham Park, NJ.
EDS Coal Liquefaction Process Development. Phase IV. Annual Technical Progress Report, July 1, 1978-June 30, 1979.
W. R. Epperly. Sep 79, 516p
Contract EF-77-A-01-2893

Development of the EXXON EDS Coal Liquefaction Process during the past year included: construction and operation of coal liquefaction pilot plants to optimize conditions and evaluate different coals, further studies on hydrogenation of organic, bench-scale experiments, mathematical model development, correlations, product quality and performance studies, market studies, stability of coal liquid product in storage, coking and gasification of residues, commercial plant design and economic analysis, etc. (ERA citation 05:012957)

FE-2893-36 PC **A02**/MF **A01**
Exxon Research and Engineering Co., Florham Park, NJ.
EDS Coal Liquefaction Process Development. Phase IV. EDS Commercial Plant Study Design Update. Onsite Design Basis: Illinois Coal Market Flexibility Sensitivity Case. Interim Report.
W. R. Epperly. Jul 79, 24p
Contract EF-77-A-01-2893
U.S. Sales Only.

This document sets forth changes to the Revised Onsite Design Basis for the Illinois Coal Base Case to describe the Market Flexibility Sensitivity Case. The Illinois Coal Market Flexibility Sensitivity Case is based on producing hydrogen by partial oxidation of vacuum bottoms instead of steam reforming of methane, ethane and propane (as in the base case). The methane/ethane product released by elimination of steam reforming is to be sold as high Btu gas (HBG). HBG will also be used as backup fuel in the fuel system. The Sensitivity Study Design will have two (instead of three) FLEXICOKING units to produce low Btu gas (LBG) for plant fuel. The total vacuum bottoms feed rate to FLEXICOKING is only about 50% of the rate in the Base Case, because about 50% of the plant vacuum bottoms are fed to partial oxidation to produce H sub 2 . The plant is still in fuel balance with LBG because the onsite fuel requirements are much lower than in the Base Case due to the absence of steam reforming which uses about 60% of the onsite plant fuel in the base case. The FLEXICOKING units provide onsite LBG fuel needs plus some spillover to offsite steam boilers. Some other changes resulting from the economic analysis are described. (ERA citation 05:012958)

FE-2893-38 PC **A04**/MF **A01**
Exxon Research and Engineering Co., Florham Park, NJ.
EDS Coal Liquefaction Process Development. Phase IV. Monthly Technical Progress Report, July 1-31, 1979.
W. R. Epperly. Aug 79, 64p
Contract EF-77-A-01-2893
U.S. Sales Only.

The operation of pilot plants for parameter optimization and evaluation of different coals is described. This included vacuum bottoms recycle operations; since this CLPP pilot was not achieving expected results, a research program was initiated to investigate the chemical structure of the liquefaction bottoms. Work is continuing on the economics analysis and design of a commercial plant case design. Various computer calculations, mathematical models and material balance studies in support of this are described - procurement for and construction of the ECLP pilot plant are discussed. (ERA citation 05:012959)

FE-3055-T15 PC **A03**/MF **A01**
Pittsburg and Midway Coal Mining Co., Denver, CO.
SRC-II Demonstration Project. Task Control Plans, Phase Zero.
12 Dec 78, 38p
Contract ET-78-C-01-3055

The Task Control Plans developed by P and M and Stearns-Roger serve as useful tools for the control of project manpower, costs and schedules during Phase Zero. The control plans supplement the Project Management Plan and are a further exemplification of the management control systems and a procedures presented in the SRC-II Demonstration Project Management Plan. Budgeted manpower is tabulated on each Task Control Plan below a diagram showing milestone and intermediate event schedules by task and subtask. Actual manpower by task also will be tabulated for comparison with the budgeted manpower and significant variances will be explained. Close supervision of manpower variances is a prime factor for cost control since it is recognized that costs during Phase Zero essentially are controlled by manpower. The Task Control Plans will be used to monitor the progress of each task and subtask and for determination of the monthly status of each activity within a task. An estimate of percentage completion for each task will be tabulated on the Task Control Plans on a monthly basis. (ERA citation 05:011104)

FE-3055-T16 PC **A04**/MF **A01**
Pittsburg and Midway Coal Mining Co., Denver, CO.
SRC-II Demonstration Project. Project Management Plan, Phase Zero.
8 Dec 78, 69p
Contract ET-78-C-01-3055

The SRC-II Demonstration Project will result in the design, construction, operation and evaluation of a coal liquefaction plant from which the primary product is an environmentally acceptable liquid fuel oil derived from domestic high-sulfur bituminous coal. The project is comprised of four phases. Phase Zero consists of a preliminary design for a 6000 TPCD Demonstration Plant module, cost estimates for this module and an expansion to a full 30,000 TPCD Commercial Plant plus conceptual design and cost estimates for a 30,000 TPCD grass roots plant, development of an organization to direct and manage the project, and various other plans and reports. Among these are a cost sharing plan, a plan for project completion, a market analysis and an economic evaluation of the SRC-II design. This phase began on July 10, 1978, and will be completed on April 30, 1979. Phase I, II, and III are described briefly. (ERA citation 05:011105)

FE-3055-T2(V.1) PC **A03**/MF **A01**
Pittsburg and Midway Coal Mining Co., Denver, CO.
SRC-II Demonstration Project. Phase Zero, Task Number 3: Deliverable Number 8. Volume 1. Conceptual Commercial Plant: Summary.
31 Jul 79, 48p
Contract ET-78-C-01-3055

This Deliverable describes a Conceptual Commercial Plant (CCP) using the SRC-II Solvent Refined Coal process for the production of liquid and gaseous hydrocarbon synthetic fuels and by-products from coal. A CCP would charge about 33,500 tons of coal per stream day (tpsd) and be comparable to a 100,000 barrels per stream day (bpsd) petroleum refinery in energy output. The Conceptual Commercial Plant envisioned in this report would produce 56,000 bpsd of fuel oil and 51 million cubic feet per day (MM cfd) of pipeline gas. Other products would include an aromatic naphtha which when further processed would produce a high octane blending stock for gasoline, and light hydrocarbons which could be converted to ethylene (a basic petrochemical building block), providing the basis for a downstream petrochemical complex. The SRC-II plant described here is designed to protect the environment. Recognizing that the SRC-II feedstock is to be a high sulfur bituminous coal which is not suitable for direct firing under current EPA regulations without expensive sulfur removal equipment, this plant has been designed to remove the sulfur contaminant as a by-product. Disposition of other wastes will be accomplished economically in an environmentally acceptable manner. Volume 1 is a general summary of the information presented in the succeeding volumes and touches briefly on feedstocks, products, thermal efficiency, companion plants, future technology, environmental considerations, and projected capital and operating costs. (ERA citation 05:009583)

FE-3055-T2(V.2) PC **A19**/MF **A01**
Pittsburg and Midway Coal Mining Co., Denver, CO.
SRC-II Demonstration Project. Phase Zero, Task Number 3: Deliverable Number 8. Volume 2. Conceptual Commercial Plant: Plant Description.
31 Jul 79, 439p
Contract ET-78-C-01-3055

Volume 2 describes, in concept, an SRC-II coal conversion facility which could be constructed during the 1990's. It also defines the basic elements of configuration, product slate, thermal efficiency and costs. The Conceptual Commercial Plant defined here is based on processing 33,500 tons per stream day of high sulfur Powhatan coal to produce not only the low-sulfur fuel oils and pipeline gas produced by the initial SRC-II facilities but also an aromatic naphtha stream and light hydrocarbon gases. The aromatic naphtha can be upgraded to produce a high octane blending stock and the light hydrocarbon gases can be upgraded to ethylene, a basic raw material for the petrochemical industry. This volume describes a grass-roots facility located on an unspecified site, since

an exact location cannot be defined. Detailed descriptive information on the engineering design of the Conceptual Commercial Plant is provided. It includes process flow sheets, block diagrams and tabulated data on charge coal, products, operating conditions and equipment lists. Licensors' and manufacturers' names are used in this volume for the purpose of identification of the type of process, an item of equipment or as a source of information or material. It is not meant to imply that these are the only acceptable sources that will be available. (ERA citation 05:009584)

FE-3055-T2(V.3) PC **A07**/MF **A01**
Pittsburg and Midway Coal Mining Co., Denver, CO.
SRC-II Demonstration Project. Phase Zero, Task Number 3: Deliverable Number 8. Volume 3. Conceptual Commercial Plant: Supporting Reports.
31 Jul 79, 143p
Contract ET-78-C-01-3055

Volume 3 contains an independent engineering evaluation of the design of the Conceptual Commercial Plant prepared by Scientific Design Company, Inc. This evaluation includes a process design review, a review of estimating procedures, and recommendations for process improvement. This volume also contains letters from process licensors and manufacturers of high technology equipment commenting on availability and applicability of processes or equipment of special nature as applied in the Conceptual Commercial Plant design. This volume contains a technical report prepared by Gulf Science and Technology Company showing how process and utility integration of the Conceptual Commercial Plant with possible downstream processing units provides potential savings for all the process operations. Finally, this volume contains engineering judgments and evaluations by a variety of engineering organizations. Not all these evaluations are in agreement. The differences now evident are expected to be resolved in the course of normal design engineering. (ERA citation 05:009585)

FE-3055-T2(V.4) PC **A02**/MF **A01**
Pittsburg and Midway Coal Mining Co., Denver, CO.
SRC-II Demonstration Project. Phase Zero, Task Number 3: Deliverable Number 8. Volume 4. Conceptual Commercial Plant: Advanced Process and Technology.
31 Jul 79, 3p
Contract ET-78-C-01-3055

The SRC-II process has evolved from many years of research and development on solvent refining of coal. It produces high yields of liquid and gaseous fuels that could reduce the nation's dependence on imported petroleum. The fuel products are environmentally clean and the liquid products can be converted to transportation fuels using technology that has been developed in pilot plant operations. Gulf scientists and engineers working in the field of coal liquefaction have conceived a number of promising ideas presently embodied in the R and D programs for improving the SRC-II process. Expected potential benefits include reduced costs, improved operability and increased feedstock flexibility. On the basis of work completed to date and planned, commercial plants constructed in the 1990's could embody numerous significant advances compared to present designs. Such evolutionary developments would follow precedents demonstrated by catalytic cracking, alkylation and other petroleum refining processes. The work described in this volume has been to forecast and evaluate possible advances in SRC-II designs that might be expected by the mid-1990's. Concepts and data employed in this evaluation are Gulf proprietary. (ERA citation 05:009586)

FE-3055-T3(V.1) PC **A02**/MF **A01**
Pittsburg and Midway Coal Mining Co., Denver, CO.
SRC-II Demonstration Project. Phase Zero, Task Number 15: Deliverable Number 12. Volume 1. Plan and Estimated Cost for Phases I, II and III: Management Plan Summary.
31 Jul 79, 25p
Contract ET-78-C-01-3055

This document summarizes the Project Management Plan, costs and schedule for the SRC-II Demonstration Project. It provides a brief summary of technical aspects, the management plan, management control systems, costs, and economic considerations applicable to the Project. Complete details on these subjects are contained in Deliverable No. 12, Plan and Estimated Costs for Phases I, II, and III, Volumes 2 and 3, Project Management Plan and Project Baseline Plans. The Pittsburg and Midway Coal Mining Co. (P and M), a wholly owned subsidiary of the Gulf Oil Corporation, is committed to the successful conduct of this Project in accordance with the terms and conditions of contract DE-AC05-780R03055. (ERA citation 05:009588)

FE-3055-T3(V.2) PC **A06**/MF **A01**
Pittsburg and Midway Coal Mining Co., Denver, CO.
SRC-II Demonstration Project. Phase Zero, Task Number 15: Deliverable Number 12. Volume 2. Plan and Estimated Cost for Phases I, II and III: Project Management Plan.
31 Jul 79, 103p
Contract ET-78-C-01-3055

The Project Management Plan (PMP) describes procedures The Pittsburg and Midway Coal Mining Co. (P and M), (a wholly owned subsidiary of the Gulf Oil Corporation acting through Gulf Mineral Resources Co. (GMRC)), will use to manage the design, construction and operation of the SRC-II Demonstration Plant to produce liquid products using the Solvent Refined Coal Process known as SRC-II. P and M has administrative responsibility for the Project; however, Gulf Oil Corporation (Gulf) will support all facets of the Project. The PMP is part of Deliverable No. 12, Plan and Estimated Costs for Phases I, II, and III which has been prepared in three volumes: Volume 1 is the Management Plan Summary, Volume 2 is the Project Management Plan and includes the Technical and Commercial Considerations (Appendix A to the PMP) and Volume 3 is Project Baseline Plans (Appendix B to the PMP). (ERA citation 05:009589)

FE-3210-T1 PC **A02**/MF **A01**
Suntech, Inc., Marcus Hook, PA.
Addendum to Refining to High Yields of Jet Fuels from Shale Oil. Fourth Technical Progress Report.
J. J. vanVenrooy. 2 Feb 79, 16p
Contract ET-78-C-01-3210

Whole Paraho shale oil was hydrotreated in Suntech's Pilot Plant to produce between 10 and 15 gallons each of liquid product having a nitrogen content at the 5000, 2000, and 500 ppM N level. Hydrogen consumptions to achieve these various degrees of denitrification were determined. Much additional useful data was obtained on the performance of the Shell 324 nickel molybdate on alumina catalyst in the shale oil system. Operating stability of the system, when running under the most severe conditions, has not been demonstrated with certainty. (ERA citation 05:013109)

Juel-1433 PC **A02**/MF **A01**
Kernforschungsanlage Juelich G.m.b.H. (Germany, F.R.). Inst. fuer Reaktorbauelemente.
ADAM I - Methanation Pilot Plant.
B. Hoehlein. Jul 77, 24p
In German.
U.S. Sales Only.

From the engineering point of view, the report gives a description of a Nuclear Long-Distance Energy Circuit for the example of a combined methane steam reforming/methanation reaction system. With the description of the pilot plant ADAM I, at present under construction in Juelich, the report points out to fundamental problems involved in the methanation process and indicates possible solutions. The experimental results achieved with the pilot plant ADAM I and the results of catalyst tests will contribute considerably to the optimization of the methanation process within the Nuclear Long-Distance Energy System. (Atomindex citation 09:414766)

LETC/RI-79/8 PC **A03**/MF **A01**
Wyoming Univ., Laramie. Dept. of Civil Engineering.
Complete Elastic Constants and Stiffness Coefficients for Oil Shale.
K. P. Chong, K. Uenishi, and J. W. Smith. Nov 79, 36p

Equations estimating Young's Moduli and Poisson's ratios for oil shale loaded perpendicular (E/sub z/, nu /sub zx/) and parallel (E/sub x/, nu /sub xy/) to the rock's bedding planes are developed and presented. These prediction equations are linear functions of the volume of organic matter in the rock. This organic volume, computed from Fischer assay oil yield, is the primary variable affecting mechanical properties of Green River Formation oil shale. The elastic constants are also complex functions of stress level. The prediction equations were developed statistically from results of a comprehensive testing program conducted on Green River Formation oil shale from the Mahogany zone and adjacent stratigraphic sections in a core taken near the Anvil Points Demonstration Mine in Colorado. In addition it is mathematically demonstrated that the 12 nonzero coefficients in the stiffness matrix for oil shale can be calculated from the same elastic constants. To summarize the relationships presented, all of the elastic constants and stiffness coefficients are calculated for a range of organic volumes and stress levels and presented in tabular form, providing complete three-dimensional characterization of Green River Formation oil shale. (ERA citation 05:009679)

ORNL-5635 PC **A03**/MF **A01**
Oak Ridge National Lab., TN.
Assessment of Advanced Process Concepts for Liquefaction of Low H sub 2 :CO Ratio Synthesis Gas Based on the Koelbel Slurry Reactor and the Mobil-Gasoline Process.
M. L. Poutsma. Feb 80, 47p
Contract W-7405-ENG-26

The Koelbel reactor is a three-phase Fischer-Tropsch reactor in which synthesis gas is passed upward through a slurry of finely divided catalyst in a heavy oil medium and products are removed overhead. Koelbel claimed that this reactor configuration allowed the processing of synthesis gas with low H sub 2 :CO ratios at high single-pass conversion with excellent temperature control and without the rapid aging because of carbon deposition normally encountered with such feeds in other reactor types. These reactor characteristics might thus allow conversion of the low H sub 2 :CO ratio output from second-generation coal gasifiers directly without preliminary water-gas shifting and without extensive recycle. Such operation should result in improved thermal efficiency and decreased processing costs. However, the product distribution reported was relatively conventional for Fischer-Tropsch performance so that the need for octane improvement for gasoline production would still exist. The Mobil-Gasoline process converts methanol to high-octane gasoline in high efficiency. There are recent indications that the shape-selective zeolite catalyst used might also accept crude Fischer-Tropsch products as a feed instead of methanol. Conceptual combination of all these observations leads to an advanced indirect liquefaction scheme for coal consisting of a second-generation gasifier coupled to a slurry Fischer-Tropsch reactor coupled to a Mobil-Gasoline upgrading unit. This concept is developed further, but it is noted that other investigators have had some difficulty in repeating Koelbel's very favorable results. (ERA citation 05:012962)

ORO-3054-T3 PC **A22**/MF **A01**
Southern Co. Services, Inc., Birmingham, AL.
SRC-I Coal Refinery. Tasks 1 and 2. Preliminary Demonstration Plant Design and Cost Estimates and Long Lead Procurement Planning: Summary.
31 Jul 79, 514p
Contract ET-78-C-05-3054

Is it technologically and economically feasible to refine raw coal of high sulfur content into an environmentally acceptable solid product that will reduce the nation's dependence on imported oil. The short answer is yes. The longer answer is given in this volume and the 14 other volumes which complete Phase 0 of a four-phase project to design, construct, operate, and evaluate the first module of a multimodule commercial plant. This first module will be a demonstration plant with the capacity to refine 6000 tons per day (TPD) of raw coal. The full commercial plant will consist of five such modules. Phase 0 has required the contractors to conduct an extensive study of the Solid Solvent Refined Coal (SRC-I) process and to provide

preliminary design and cost estimates for the demonstration plant. The work has included preparing basic process descriptions and specifications, process flow and control diagrams, heat and material balances, mechanical and other detailed specifications for the critical equipment (defined as complex items requiring special fabrication that affect the overall design), single line electrical diagrams, utility summaries, waste stream lists, plot plans, a plant model, a process hazards reveiw, operational studies, and a technical risk assessment. Special attention has been paid to examining the process trade-offs and the technical uncertainties, to evaluating the design data base, and to identifying areas where additional data is needed. The full range of the potential impact of the SRC-I process on the environment has been investigated and a preliminary selection of the best available technology for mitigating any adverse effects has been made. (ERA citation 05:012963)

ORO-3054-T3(App.A) PC **A99**/MF **A01**
Southern Co. Services, Inc., Birmingham, AL.
SRC-I Coal Refinery. Task 1, Appendix A. SRC Process Plant: Filtration Deashing.
31 Jul 79, 792p
Contract ET-78-C-05-3054

Under subcontract to Air Products and Chemicals, Inc. (APCI), Catalytic, Inc. (Catalytic) had the responsibility during this Phase Zero effort to carry out a preliminary process study and cost estimate for the 6000 TPD SRC-I Demonstration Plant. Catalytic's involvement was limited to two areas, as follows: Area 12 - SRC Process; and Area 13 - Deashing. In this study, SRC Deashing is accomplished by Filtration. A secondary study, in which the SRC Deashing is accomplished via the Kerr-McGee Critical Solvent Process, is presented in a separate report. Catalytic's scope in these areas included generating heat and material balances, developing process and control flow diagrams, sizing equipment, estimating utilities requirements, and preparing estimates of costs and schedule for completion through Phases I and II of the demonstration plant program. All of this information is presented to demonstrate the technical feasibility of producing solid SRC. (ERA citation 05:012964)

ORO-3054-T3(App.B) PC **A99**/MF **A01**
Southern Co. Services, Inc., Birmingham, AL.
SRC-I Coal Refinery. Task 1, Appendix B. Gas Systems Plants.
31 Jul 79, 736p
Contract ET-78-C-05-3054

The Ralph M. Parsons Company was commissioned by Air Products and Chemicals, Inc. to perform the initial phase study consisting of the evaluation of various commercial process techniques and to develop an economical and viable processing concept with respect to the Gasification, Gas Treating, Compression, and Sulfur Recovery Areas for the 6000-TPd SRC-I Demonstration Plant that is to be built near Newman, Kentucky. This report has been prepared to facilitate a comprehensive review of the facilities as well as responding to the specific sub-tasks as established for this study. There are four areas which constitute the SRC-1 Demonstration Plant Gas System: Area 15 - Gasification; Area 16 - Gas Treating, DEA Unit, Selexol Unit, and Ammonia-Sulfide Stripping Unit; Area 17 - Compression; and Area 18 - Sulfur Recovery, Claus Unit, and Beavon Sulfur Removal Unit. A complete description of each area and/or unit is included in accordance with the following: process design, process waste stream list, mechanical equipment specifications, operational studies, process hazards review, schedule for Phases I and II, capital investment summary, and plot plans and model photographs. (ERA citation 05:012965)

ORO-3054-T3(App.C) PC **A10**/MF **A01**
Southern Co. Services, Inc., Birmingham, AL.
SRC-I Coal Refinery. Task 1, Appendix C. Air Separation and Hydrogen Recovery Plants.
31 Jul 79, 221p
Contract ET-78-C-05-3054

Air separation plants (to produce oxygen) and the hydrogen recovery system related to the SRC process demonstration plant are described: design, equipment, specifications, waste streams, hazards, capital investment, etc. (ERA citation 05:012966)

ORO-3054-T3(App.D) PC **A12**/MF **A01**
Southern Co. Services, Inc., Birmingham, AL.
SRC-I Coal Refinery. Task 1, Appendix D. Coker-Calciner Plant.
31 Jul 79, 275p
Contract ET-78-C-05-3054

The Lummus Company has been engaged to conduct an engineering study of the coker/calciner system to be incorporated in the proposed SRC-I demonstration plant. Lummus's assignment during Phase 0 is to prepare a preliminary process design and a cost estimate for the coker/calciner system. The Delayed Coker/Calciner Plant will produce anode grade coke from deashed Solvent Refined Coal (SRC-I). Byproducts of this plant will include a light oil stream with 378 exp 0 F ASTM end point and a heavy oil stream with an Initial Boiling Point (IBP) of 373 exp 0 F. The description of the process can readily be followed by referring to the Process and Control Diagrams, and the simplified flow scheme. The Lummus delayed coking process was selected because of the extensive experience of Lummus over many years in designing both petroleum residue cokers and coal tar pitch coking units. The design and operation of coal tar pitch coking units are particularly relevant to the process and mechanical requirements of a delayed coker fed with solvent refined coal (SRC-I) in the liquid state. (ERA citation 05:012967)

ORO-3054-T3(App.E) PC **A20**/MF **A01**
Southern Co. Services, Inc., Birmingham, AL.
SRC-I Coal Refinery. Task 1, Appendix E. Utilities and off-Sites.
31 Jul 79, 474p
Contract ET-78-C-05-3054

This Preliminary Design Report presents the preliminary technical data and the capital investment summary for the Utilities and Offsites portion of the 6000 TPD SRC plant. Utilities includes electric power and water supplies and lines in the plant, coal receiving and preparation (including materials handling), waste streams, hazards, equipment specifications and process control equipment. Information on which the design of the above depends is described. Process description, P and CD's, design basis, process trade-off and technical uncertainty studies, heat and material balances, process specifications, utility summary, electrical single line diagrams, and the utility distribution diagrams. (ERA citation 05:012968)

ORO-3054-T3(App.F) PC **A21**/MF **A01**
Southern Co. Services, Inc., Birmingham, AL.
SRC-I Coal Refinery. Task 1, Appendix F. Kerr-McGee Critical Solvent Deashing.
31 Jul 79, 492p
Contract ET-78-C-05-3054

The objective of this program is to design, construct, operate, and evaluate a 6000 TPD SPC-I Demonstration Plant as the first module of a 30,000 TPD commercial scale plant. Under subcontract to Air Products and Chemicals, Inc. (APCI); Catalytic, Inc. (Catalytic) had the responsibility to carry out a preliminary process study and cost estimate for the 6000 TPD SRC-I Demonstration Plant. Catalytic's involvement was limited to two areas, as follows: Area 12 - SRC process, and Area 13 - Deashing. In this Appendix, SRC deashing is accomplished by the Kerr-McGee Critical Solvent Deashing (CSD) Process. The onsite design for the Kerr-McGee CSD Process was prepared by Catalytic, Inc. Catalytic's scope in these areas included generating heat and material balances, developing process and control flow diagrams, sizing equipment, estimating utilities requirements, and preparing estimates of costs for Phases I and II of the demonstration plant program. All of this information is presented in Sections II through VIII. The design changes necessary to generate hydrogen from ash concentrate produced by the Kerr-McGee CSD Process are documented. The changes required in utilities and offsites for the Kerr-McGee CSD Process are provided in Section X. (ERA citation 05:012969)

ORO-3054-T4(Pt.A) PC **A12**/MF **A01**
Southern Co. Services, Inc., Birmingham, AL.
SRC-I Coal Refinery. Task 3A. Market Analysis.
31 Jul 79, 264p
Contract ET-78-C-05-3054

With nuclear power plagued by uncertainty, coal may have to carry an even larger burden for electricity generation and other forms of energy than the tripling of use already contemplated. To achieve the necessary expansion, most uses of coal will have to meet stringent environmental standards. Under the New Source Performance Standards (NSPS) published in June 1979, most coals, regardless of sulfur content, will require air pollution control when burned. Pre-cleaning technologies such as SRC-I have a simple but fundamental advantage over other methods. Since the fuel already has been cleaned, there is no need for elaborate combustion or post-combustion cleaning technologies that can force shutdowns of the entire utility generating plant for repair or maintenance of the pollution control equipment. In addition, because SRC products are clean burning, undesirable slagging and ash are minimized which further improves boiler availability. Extensive burn tests including a commercial-scale test have shown that SRC qualifies as a compliance fuel for new boilers under the revised NSPS, not only for sulfur dioxide, but for nitrogen oxide, and, with the use of appropriate cntrol equipment, for particulates. SRC also complies with the emission standards for the retrofit of old boilers and other combusters. In combination with SRC, TSL makes possible a high output of liquids that, taken together, are essentially the equivalent of conventional crude oil. This synthetic crude can be upgraded and refined into essentially all of the end-use products distilled from conventional crude oil, although some products, such as gasoline, would be more economical than others such as diesel and jet fuels. In addition, SRC is well suited for entry into the carbon products market. (ERA citation 05:012971)

ORO-3054-T4(Pt.3B) PC **A05**/MF **A01**
Southern Co. Services, Inc., Birmingham, AL.
SRC-I Coal Refinery. Task 3B. Economic Assessment.
31 Jul 79, 91p
Contract ET-78-C-05-3054

An important part of the Phase 0 analysis has been to review the possibilities for developing a commercial market for the products of the SRC plant. One stage of this analysis was to develop the capital and operating costs of a new 30,000 TPD SRC Plant to be built in the 1983-1987 time period, and operated in the 1988-2007 time period. The capital and operating costs developed for this plant were in 4th quarter 1978 dollars, and were based on the assumption that this would be the Nth Plant - a plant built as part of an existing industry; after other plants were built and the technology was proven on a large scale. In order to better understand the economic impact of these costs, a sensitivity analysis was performed on the costs, which were restated into current dollars as of the year expended. In addition to the analysis required by DOE, the JV also carried out several additional analyses to illustrate the effect of assumptions which it felt were more realistic. The conclusion of these analyses is that SRC could be manufactured for $5.00 to 6.50 per MM Btu in 1988 in an Nth Plant costing approximately $2.3 billion in current dollars based on a 6% inflation rate. The 1988 price of $5.00 to 6.50 per MMBTS is equivalent to a 1978 price of $2.80 to $3.65 per MMBTU, deflated at 6% per annum. Thereafter, assuming a 6% annual inflation rate in coal and other operating costs, the cost of SRC would increase at 4.3% per year over a 20-year period. Thus, on a levelized basis, the cost of the SRC would be below the $2.80 to $3.65 range. (ERA citation 05:012979)

ORO-3054-T6 PC **A12**/MF **A01**
Southern Co. Services, Inc., Birmingham, AL.
SRC-I Coal Refinery. Task 5. Definitization Plan for Phases I, II, and III.
31 Jul 79, 267p
Contract ET-78-C-05-3054

A definitive plan has been prepared for the design, procurement, construction, and operation of an SRC-I Coal Refinery for processing approximately 6000 TPD of Kentucky No. 9 coal to produce products which can displace oil. The plan contemplates locating the plant, costing approximately $500 million, at a site near Newman in Daviess County, Kentucky with initial operation of the facility in January 1984. It recommends that the plant include a second stage of liquefaction (LC-Fining) for processing a portion of the product SRC into fuel oil or

feedstock for gasoline and/or petrochemicals. The site was selected via a meticulous procedure of elimination by the Rust Engineering Company under contract to the Kentucky Center for Energy Research. The site is accessible by highway, railroad, and river barge, and is located in a coal belt so that the coal supply finally selected should be within 55 miles of the site. The Phase 0 technical studies indicate that viable alternatives are available for all of the processing steps required. Final decisions must be made early in Phase 1 on (1) the method for solids separation, (2) the type of gasifier to be used for generating hydrogen, and (3) the design capacity to be included for further processing of product SRC to coke by coking/calcining and for a second liquefaction stage to convert product SRC to liquid fuels. The final decisions will be based on up-to-date information from the pilot plants along with strategic marketing, legal, and economic considerations. (ERA citation 05:012972)

PB80-810393 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Electrodialysis Desalination. 1964-April, 1980 (Citations from the NTIS Data Base).
Rept. for 1964-Apr 80,
Diane M. Cavagnaro. May 80, 169p
Supersedes NTIS/PS-79/0325 and NTIS/PS-78/0243. For the companion Published Search of the Engineering Index Data Base, see PB80-810401.

The bibliography cites Federally-funded research reports on electrodialysis desalination, including theory, membrane preparation and performance, and test and pilot plant operations. Reports are cited which cover water treatment operations as well as waste treatment processes. (This updated bibliography contains 162 abstracts, 7 of which are new entries to the previous edition.)

PB80-810401 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Electrodialysis Desalination. 1970-April, 1980 (Citations from the Engineering Index Data Base).
Rept. for 1970-Apr 80,
Diane M. Cavagnaro. May 80, 128p
Supersedes NTIS/PS-79/0326 and NTIS/PS-78/0244. For the companion Published Search of the NTIS Data Base, see PB80-810393.

Citations concerning electrodialysis desalination from journals covering worldwide engineering research are presented. Included are studies on theory, membrane preparation, performance evaluation, tests, and pilot plant operations. Both drinking water and waste water treatment processes are discussed. (This updated bibliography contains 121 abstracts, 12 of which are new entries to the previous edition.)

SAN-1429-40 PC **A02**/MF **A01**
Atomics International Div., Canoga Park, CA. Energy Systems Group.
Molten Salt Coal Gasification Process Development Unit. Quarterly Technical Progress Report No. 10, July-September 1978.
1 Nov 78, 23p
Contract EF-77-C-03-1429

This tenth quarterly progress report on the Molten Salt Coal Gasification Process Development Unit (PDU) Project includes the design, construction, and operation of a PDU which will convert one ton of coal per hour into low-Btu gas. All construction administrative activities have been completed. Plant discrepancies noted during the construction to startup turnover review were resolved. All equipment and subsystems associated with the initial gasification run were checked out and are operational while startup checkouts of other plant equipment continues. A final safety analysis report was completed and issued. (ERA citation 05:011072)

SAN-1429-44 PC **A02**/MF **A01**
Atomics International Div., Canoga Park, CA. Energy Systems Group.
Molten Salt Coal Gasification Process Development Unit. Quarterly Technical Progress Report No. 11, October-December 1978.
25 Jan 79, 24p
Contract EF-77-C-03-1429

This represents the 11th quarterly progress report on the Molten Salt Coal Gasification Process Development Unit (PDU) Project. The project includes the design, construction, and operation of a PDU which will convert one ton of coal per hr into low-Btu gas. All PDU system components and subsystems have been checked out. The integrated solids feed, gasifier/quench, product gas, and combustion air systems were operated successfully at atmospheric pressures for 157 hr, 115 of which were under gasification conditions. Startup was performed with coke fuel. The campaign ended with the gasification of coal at rates up to 400 lb/hr and the production of 100 Btu/scf gas. (ERA citation 05:011073)

SAN-1429-48 PC **A02**/MF **A01**
Atomics International Div., Canoga Park, CA. Energy Systems Group.
Molten Salt Coal Gasification Process Development Unit. Quarterly Technical Progress Report No. 12, January-March 1979.
24 Apr 79, 23p
Contract EF-77-C-03-1429

This represents the 12th quarterly progress report on the Molten Salt Coal Gasification Process Development Unit (PDU) Project. The project includes the design, construction, and operation of a PDU which will convert 1 ton of coal per hour into low-Btu gas. The solids feed, gasifier/quench, product gas, combustion air, ash removal and sulfur removal systems have been operated as an integrated unit. The gasifier was operated at atmospheric pressure for 240 hr, 225 of which were under gasification conditions. Product gas with a heating value of approximately 100 Btu/scf was produced at coal gasification rates up to 440 lb/hr. (ERA citation 05:011074)

SERI/TR-312-471 PC **A05**/MF **A01**
Ecotope Group, Seattle, WA.
Report on the Design and Operation of a Full-Scale Anaerobic Dairy Manure Digester. Final Report.
E. Coppinger, J. Brautigam, J. Lenart, and D. Baylon. Dec 79, 87p
Contract EG-77-C-01-4042

A full-scale anaerobic digester on the Monroe State Dairy Farm was operated and monitored for 24 months with funding provided by the United States Department of Energy, Fuels from Biomass Systems Branch. During the period of operation, operating parameters were varied and the impact of those changes is described. Operational experiences and system component performance are discussed. Internal digester mixing equipment was found to be unnecessary, and data supporting this conclusion are given. An influent/effluent heat exchanger was installed and tested, and results of the tests are included. Recommendations for digester design and operation are presented. Biological stability was monitored, and test results are given. Gas production rates and system net energy are analyzed. The economics of anaerobic digestion are evaluated based on various financing options, design scales, and expected benefits. Under many circumstances digesters are feasible today, and a means of analysis is given. (ERA citation 05:011420)

UCRL-83006 PC **A02**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Scoping of Fusion-Driven Retorting of Oil Shale.
T. R. Galloway. Nov 79, 11p CONF-791102-69
Contract W-7405-ENG-48
Symposium on engineering problems of fusion research, San Francisco, CA, USA, 13 Nov 1979.

In the time frame beyond 2005, fusion reactors are likely to make their first appearance when the oil shale industry will probably be operating with 20% of the production derived from surface retorts operating on deep mined shale from in situ retorts and 80% from shale retorted within these in situ retorts using relatively fine shale uniformly rubblized by expensive mining methods. A process was developed where fusion reactors supply a 600 exp 0 C mixture of nitrogen, carbon dioxide, and water vapor to both surface and in situ retorts. The in situ production is accomplished by inert gas retorting, without oxygen, avoiding the burning of oil released from the larger shale particles produced in a simpler mining method. These fusion reactor-heated gases retort the oil from four 50x50x200m in-situ rubble beds at high rate of 40m/d and high yield (i.e., 95% F.A.), which provided high return on investment around 20% for the syncrude selling at $20/bbl, or 30% if sold as $30/bbl for heating oil. The bed of 600 exp 0 C retorted shale, or char, left behind was then burned by the admission of ambient air in order to recover all of the possible energy from the shale resource. The hot combustion gases, mostly nitrogen, carbon dioxide and water vapor are then heat-exchanged with fusion reactor blanket coolant flow to be sequentially introduced into the next rubble bed ready for retorting. The advantages of this fusion-driven retorting process concept are a cheaper mining method, high yield and higher production rate system, processing with shale grades down to 50 l/mg (12 gpt), improved resource recovery by complete char utilization and low energy losses by leaving behind a cold, spent bed. (ERA citation 05:011282)

UCRL-83614 PC **A02**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Laser Cleanup of H sub 2 S from Synthesis Gas.
H. L. Chen, and C. Borzileri. 8 Jan 80, 16p
CONF-791220-4
Contract W-7405-ENG-48
International conference on lasers '79, Orlando, FL, USA, 17 Dec 1979.

Hydrogen sulfide at the 10 ppM level has been selectivity stripped from a CO + H sub 2 synthesis gas by photolysis with an ArF laser. The sulfur in the atomic or radical form is irreversibly removed by a metal surface. Spectroscopic and quantum yield data are presented. An H sub 2 S spectroscopic selectivity > 10 exp 7 was measured in the 210 to 220 nm range, a wavelength range compatible with Raman-shifted ArF or KrF lasers. The laser purification method described here is a potential practical approach to achieve sulfur impurity levels < 0.1 ppM. This method is of potential industrial significance for extending the lifetime of syngas metal catalysts. (ERA citation 05:011046)

UCRL-83771 PC **A02**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Materials Problems in Production, Transport, and Storage of Hydrogen.
O. H. Krikorian. 2 Jan 80, 13p
Contract W-7405-ENG-48

Advanced technologies for hydrogen production include thermochemical cycles, advanced water electrolysis, and high temperature steam electrolysis. In hydrogen production by thermochemical cycles, materials problems center primarily around an H sub 2 SO sub 4 boiler, and H sub 2 SO sub 4 vapor decomposer, and an HI decomposer. Adequate materials are available for these applications, but further development is desirable to reduce fabrication and design problems and extend equipment lifetimes. In advanced electrolytic hydrogen production, the main thrust has been to raise cell efficiencies by raising operating temperatures and pressures using two approaches: (1) an alkaline electrolyte cell, and (2) a solid polymer electrolyte cell. The more extreme conditions in these advanced cells lead to the need for more corrosion resistant separator and electrode materials. Also, in order to maximize operating efficiency, new low-cost electrocatalysts are needed to reduce electrode overpotentials. It is especially desirable to reduce or even eliminate the use of noble metals as electrocatalysts to reduce costs. In high temperature steam electrolysis, materials problems include development of solid state electrolytes for oxide ion conduction, and electrically conductive anode, cathode and interconnecting materials for cells. Hydrogen transport is expected to be primarily by pipeline, and materials problems here deal with pipeline steels for transport of gaseous hydrogen. Long term storage of hydrogen on a large scale is anticipated to be in underground repositories much as natural gas is stored today. However for short-term or small scale uses, hydrogen storage in hydrides, or storage in glass microballoons offer certain oper-

ational advantages, such as utility in vehicular transportation and safety. Some of the materials studies on hydride and microballoon storage are briefly mentioned. (ERA citation 05:011401)

7B. Inorganic Chemistry

AD-A082 574/5 Not available NTIS
Utah Univ Salt Lake City Dept of Chemistry
Deuterated Sodium Octahydrotriborate(1-),
Mansel A. Nelson, and Goji Kodama. 29 Mar 79, 4p ARO-13451.4-CX
Grant DAAG29-76-G-0120
Availability: Pub. in Inorganic Chemistry, v18 n11 p3276-3278 1979 (No copies furnished by DTIC).

No abstract available.

PAT-APPL-6-126 063 PC **A02**/MF **A01**
National Aeronautics and Space Administration. Pasadena Office, CA.
Thermal Reactor and Process.
Patent Application,
H. Levin. Filed 29 Feb 80, 19p N80-20338/3, NASA-CASE-NPO-14369-1
Contract NAS7-100
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A thermal reactor for pyrolytically decomposing silane gas into liquid silicon and hydrogen gas is presented. A water cooled injection probe introduces the silane tangentially into a reaction chamber heated well above the decomposition temperature of silane. An outer downwardly moving vortex containing the liquid silicon and an inner upwardly moving vortex containing hydrogen gas are formed. The liquid silicon deposits into the interior walls of the reaction chamber to form an equilibrium skull layer which flows to the bottom of the reaction chamber where it is removed. The hydrogen gas is removed from the top of the reaction chamber by a vortex finder.

7C. Organic Chemistry

AD-A082 572/9 Not available NTIS
Rockwell International Thousand Oaks CA Rocketdyne Div
Simplified Synthesis of NF (+) sub 4 SbF (-) sub 6,
William W. Wilson, and Karl O. Christe. 3 Oct 79, 3p ARO-14394.5-C
Contract DAAG29-77-C-0007
Availability: Pub. in Jnl. of Fluorine Chemistry, v15 p83-84 1980 (No copies furnished by DTIC).

No abstract available.

AD-A082 575/2 Not available NTIS
Utah Univ Salt Lake City Dept of Chemistry
Bis(Trimethylphosphine) Adduct of Tetraborane(8),
Goji Kodama, and Mitsuaki Kameda. 16 Mar 79, 6p ARO-13451.3-CX
Grant DAAG29-76-G-0120
Availability: Pub. in Inorganic Chemistry, v18 n12 p3302-3306 1979 (No copies furnished by DTIC).

No abstract available.

BNL-51080 PC **A02**/MF **A01**
Brookhaven National Lab., Upton, NY.
Polyketones and Polysulfones for Conservation in the Ethylene Polymer Industry. Progress Report No. 5, April-June 1979.
Aug 79, 23p
Contract EY-76-C-02-0016

Reaction kinetic studies were continued on the exp 60 Co gamma-induced polymerization of ethylene-SO sub 2 (Et-SO sub 2) mixtures. A peak in reactivity, as measured by an overall G-value of 8.4 x 10 exp 4 molecules/100 eV, was found at 1.9 mole % SO sub 2 for gas-phase mixtures containing up to 6.7 mole % SO sub 2 and over a pressure range of 22.3 to 56.1 atm. Overall rates and G-values were obtained for liquid-phase SO sub 2 saturated with ethylene at up to 58.2 atm total pressure. A maximum G-value of 1.3 x 10 exp 5 molecules/100 eV was found in the pressure range of 34.0 to 58.2 atm. Inert gases such as helium and nitrogen in Et-SO sub 2 gas mixtures were found to reduce peak G-values by an amount greater than could be accounted for on the basis of dilution alone. The additional effect is believed to be due to buildup of an inert gas diffusion barrier at the polymerization sites. The exp 60 Co gamma-induced polymerization of propylene-SO sub 2 mixtures was investigated briefly. For the gas-phase system containing 0 to 50 mole % SO sub 2 in the 1 to 5 atm range, a maximum rate was found at equimolar gas composition. No other peak was found at a lower SO sub 2 concentration. The data indicate a power of 3 dependence of the rate on pressure and a power of 2 dependence of the G-value on pressure. A G-value of 1.38 x 10 exp 5 molecules/100 eV was obtained for liquid SO sub 2 saturated with propylene at 6.24 atm. Both gas-phase and liquid-phase product analyzed approximately 1:1 molar ratio propylene/SO sub 2 . (ERA citation 05:012113)

PAT-APPL-6-082 378 PC **A02**/MF **A01**
Department of the Army Washington DC
Novel Process for Preparing O,O' Diethyl Methylphosphonite.
Patent Application,
John M. Bane. Filed 5 Oct 79, 11p AD-D007 113/4
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A one-step process for preparing the compound o,o'dimethyl methylphosphonite without generation of undesirable by-products and large volumes of pollutant contaminated wastewater which have to be treated prior to disposal comprising the step of reacting methylphosphonous dichloride with an alkali metal ethoxide, wherein the alkali metal is selected from the group consisting of sodium, potassium, ribidium, and cesium, slurried in a hydrocarbon, to produce the product O,O'diethyl methylphosphonite and a corresponding alkali metal chloride salt by-product. The principal object of this invention is to provide a simple, one-step process for preparing the binary reactant intermediate compound O,O'diethyl methylphosphonite. A further object of this invention is to provide a process for preparing O,O'diethyl methylphosphonite without the generation of undesirable hard-to-dispose of by-products and large volumes of pollutant contaminated wastewater. A still further object of this invention is to provide a process for preparing O,O'diethyl methylphosphonite without generation of gaseous by products which are potential air pollutants. These and other objects of this invention will be apparent from the following detailed description of the invention. (Author)

PAT-APPL-6-085 416 PC **A02**/MF **A01**
Department of Health, Education, and Welfare, Washington, DC.
Method of Synthesizing Chlorozotocin.
Patent Application,
Henryk Dubicki, Jack L. Parsons, Robert J. Schultz, David F. Starks, and Fred W. Starks. Filed 16 Oct 79, 10p PB80-168495
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

This invention relates to a two-step method of synthesizing 2-(3- (2-chloroethyl)-3-nitrosoureido)-2-deoxy-D-glucopyranose by (a) reacting glucosamine hydrochloride (I) and 2-chloroethylisocyanate in alkaline aqueous milieu in the presence of sodium carbonate to produce 2-(3- (2-chloroethyl)-ureido)-2-deoxy-D-glucopyranose (II), and (b) II plus NaNO2 in the presence of 6 N HCl gives the product 2-(3- (2-chloroethyl)-3-nitrosoureido)-2-deoxy-D-glucopyranose.

7D. Physical Chemistry

AD-A082 463/1 PC **A03**/MF **A01**
California Inst of Tech Pasadena Div of Chemistry and Chemical Engineering
The Adsorption of Formic Acid on Y Zeolites: An Infrared Absorbance Study.
Technical rept.,
T. M. Duncan, and R. W. Vaughan. Mar 80, 27p Rept no. TR-16
Contract N00014-75-C-0960

The adsorption of formic acid on an ammonium-Y (NH4-Y) zeolite and an ultrastable hydrogen-Y (H-Y) zeolite has been studied with transmission infrared spectroscopy. The formic acid is determined to be chemically adsorbed on both zeolites as bidentate formate ions and as covalently bonded unidentate formate species. Assuming uniform infrared extinction coefficients for the two adsorbed formates, the NH4-Y zeolite has comparable amounts of each surface species. (Author)

AD-A082 464/9 PC **A04**/MF **A01**
California Inst of Tech Pasadena Div of Chemistry and Chemical Engineering
The Adsorption of Formic Acid on Y Zeolites: A Nuclear Magnetic Resonance Study.
Technical rept.,
T. M. Duncan, and R. W. Vaughan. Mar 80, 57p Rept no. TR-17
Contract N00014-75-C-0960

A solid state nuclear magnetic resonance (NMR) study of the adsorption of formic acid on ammonium-Y (NH4-Y) and ultrastable hydrogen-Y (H-Y) zeolites confirms the results of a previously reported infrared study and provides a further description of the adsorbed states. The formic acid is adsorbed on the NH4-Y and ultrastable H-Y zeolites in two different forms; as a unidentate formate ligand and as a bidentate formate species, as determined by the sy-metry of the chemical shift powder patterns.

AD-A082 479/7 Not available NTIS
Miami Univ FL Dept of Surgery
Nuclear Magnetic Resonance Studies of Some Cation- and Anion-Exchange Resins in Dimethyl Sulfoxide-Water Systems,
Nancy Ma Wu, and Theodore I. Malinin. 23 Apr 79, 5p
Contract N00014-75-C-0235
Availability: Pub. in Analytical Chemistry, v52 n1 p186-189 Jan 80 (No copies furnished by DTIC).

No abstract available.

AD-A082 498/7 PC **A02**/MF **A01**
Hull Univ (England) Dept of Chemistry
Rate Constants for Reactions of HO2 Radicals with Alkanes, Aldehydes, and Related Compounds,
Roy R. Baldwin, and Raymond W. Walker. 1978, 10p AFOSR-TR-80-0165
Grant AFOSR-77-3215
Pub. in International Combustion Symposium (17th), p525-533 20-25 Aug 78.

No abstract available.

AD-A082 528/1 PC **A03**/MF **A01**
Pennsylvania State Univ University Park Dept of Chemistry
Synthesis and Spectroscopic Characterization of H3CoRu3(CO)12. Crystal and Molecular Structure of the C(3v) Isomer.
Interim technical rept.,
Wayne L. Gladfelter, Gregory L. Geoffroy, and Joseph C. Calabrese. 20 Mar 80, 29p Rept no. TR-6
Contract N00014-77-C-0417

The reaction of HCoRu3(CO)13 with H2 in refluxing hexane gives the new cluster H3CoRu3(CO)12 in 75% yield. Infrared and H(1) NMR spectra indicate that the cluster exists in two isomeric forms. The structure of one isomer has determined by single-crystal x-ray diffraction. The CoRu3 core of the molecule defines a distorted tetrahedron with three carbonyls terminally bound to each metal atom. The hydride ligands were located by difference Fourier techniques and bridge the three Ru-Ru bonds. The overall symmetry of the cluster is approximately C sub 3v. Spectral evidence indicates that the second isomer contains a bridging CO ligand and three non-equivalent hydrogens. The interconversion of the two isomers and the various hydrogen exchange processes have been monitored by H(1) NMR spectroscopy and the exchange mechanisms are discussed.

AD-A082 540/6 PC **A03**/MF **A01**
Yale Univ New Haven CT Dept of Engineering and Applied Science
Intermolecular Energy Exchange by Infrared Radiometry.
Final rept. 1 Jun-31 Dec 79,

J. B. Fenn, S. B. Ryali, and S. P. Venkateshan.
31 Jan 80, 49p AFOSR-TR-80-0222
Contract F49620-79-C-0036

Excitation by translational energy of the asymmetric stretch vibrational mode of ground state carbon dioxide molecules in collision with nitrogen, oxygen and argon molecules has been studied, by intersecting two slightly collimated molecular beams in the field of view of an InSb photovoltaic detector which monitored resulting radiation in the 4.3 micrometer band. The excitation cross sections for all three combinations of partners were of similar magnitude and showed a strong dependence upon collision velocity. For nitrogen the measured cross sections ranged from about 0.0008 square Angstroms at 2 km/s to about 0.5 square Angstroms at 5 km/s. A similar but separate experiment determined an upper limit of 0.1 square Angstroms for the collisional excitation of hydrogen fluoride by krypton at energies up to 1.7 times the threshold requirement. Bulk relaxation rates for molecules in free jet expansion were also investigated. Results obtained from experimental data with the frequently used Sudden Freeze Model have been compared with those obtained by Numerical Integration. Success has been achieved in obtaining Method-of-Characteristics solutions for the free jet expansion with a varying specific heat ratio. This development provides the best description yet of relaxation in free jet expansion for any internal mode which can be characterized by a Boltzmann distribution of energy. (Author)

AD-A082 576/0 Not available NTIS
Pennsylvania Univ Philadelphia
Effect of Controlled Defects on the Microwave Transport and Dielectric Constant of Tetrathiofulvalene-Tetracyanoquinodimethane,
W. J. Gunning, and A. J. Heeger. 22 May 79, 12p ARO-14584.3-p
Grant DAAG29-77-G-0089
Availability: Pub. in Physica Status Solidi (b), v95 p433-443 1979 (No copies furnished by DTIC).

No abstract available.

AD-A082 580/2 Not available NTIS
Purdue Univ Lafayette IN Dept of Chemistry
Photochemistry of Organic Bichromophoric Molecules,
Harry Morrison. 20 Apr 79, 9p ARO-16012.3-C
Grant DAAG29-79-G-0009
Availability: Pub. in Accounts of Chemical Research, v12 p383-389 1979 (No copies furnished by DTIC).

No abstract available.

AD-A082 581/0 PC **A02**/MF **A01**
Frank J Seiler Research Lab United States Air Force Academy CO
An Electrochemical Study of Chromium in Molten NaCl-AlCl.
Journal article,
C. L. Hussey, L. A. King, and J. K. Erbacher. 23 May 77, 9p
Pub. in Jnl. of the Electrochemical Society, V125 n4 p561-566 Apr 78.

No abstract available.

AD-A082 582/8 PC **A02**/MF **A01**
Frank J Seiler Research Lab United States Air Force Academy CO
An Electrochemical Study of the Fe(III)/Fe(II) Electrode Reaction in the Aluminum Chloride + N-(n-Butyl)Pyridinium Chloride Molten Salt System.
Journal article,
C. L. Hussey, L. A. King, and J. S. Wilkes. 8 Sep 78, 14p
Pub. in Jnl. of Electroanalytical Chemistry, v102 p321-332 1979.

No abstract available.

AD-A082 583/6 PC **A02**/MF **A01**
Frank J Seiler Research Lab United States Air Force Academy CO
Vapor Pressure of Aluminum Chloride Systems. 3. Vapor Pressure of Aluminum Chloride-Sodium Chloride Melts.
Journal article,
John T. Viola, Lowell A. King, Armand A. Fannin, Jr., and David W. Seegmiller. 23 Jun 77, 5p
Pub. in Jnl. of Chemical and Engineering Data, v23 n2 p122-125 1978. See also AD-A082 584.

No abstract available.

AD-A082 584/4 PC **A02**/MF **A01**
Frank J Seiler Research Lab United States Air Force Academy CO
Vapor Pressure of Aluminum Chloride Systems. 1. Vapor Pressure and Triple Point of Pure Aluminum Chloride.
Journal article,
John T. Viola, David W. Seegmiller, Armand A. Fannin, Jr., and Lowell A. King. 15 Apr 76, 5p
See also AD-A082 643. Pub. in Jnl. of Chemical and Engineering Data, v22 n4 p367-370 1977.

No abstract available.

AD-A082 585/1 PC **A02**/MF **A01**
Frank J Seiler Research Lab United States Air Force Academy CO
Densities of AlCl3-Rich, Molten AlCl3-LiCl Mixtures.
Journal article,
Ronald A. Carpio, Lowell A. King, and Armand A. Fannin, Jr. 31 Jan 78, 4p
Pub. in Jnl. of Chemical and Engineering Data, v24 n1 p22-24 Jan 79.

No abstract available.

AD-A082 586/9 PC **A02**/MF **A01**
Frank J Seiler Research Lab United States Air Force Academy CO
Conductivities of AlCl3-Rich Molten AlCl3-LiCl Mixtures.
Journal article,
Ronald A. Carpio, Lowell A. King, Fred C. Kibler, Jr., and Armand A. Fannin, Jr. 17 Apr 78, 8p
Pub. in Jnl. of the Electrochemical Society, v126 n10 p1649-1654 Oct 79.

No abstract available.

AD-A082 612/3 PC **A02**/MF **A01**
Stanford Univ CA Dept of Applied Physics
Proton Transfers in Hydrogen-Bonded Nucleic Acids.
Final rept.,
M. Weissbluth. 8 Feb 80, 4p
Contract N00014-78-C-0317

A research group found that selective hydrogen bonds between nucleic acid bases are formed even in non-aqueous solvents and that base pair formation is not a specific characteristic of polynucleotides but rather of the purine and pyrimidine bases. By using infrared and nuclear magnetic resonance spectroscopy the structure distribution and thermodynamic function of the base pairs have been determined on the model systems. Recently it was found by use of the saturation transfer method in NMR that the amino and imino protons in the A-T, G-C base pair exchange with each other at a rate of 100/sec. The frequency of the proton transfer seems to relate to the ease of forming the tautomeric form. The proposed mechanism suggests that proton rearrangements by tunneling occur as an initial step. It is interesting that the phenomenon is most remarkable between adenine (A) and 5-bromouracil, a known mutagenic agent. Work consisted mainly in the design and improvement of the optical and spectroscopic system. The heart of the system is the optical parametric oscillator (OPO) which employs an angle-tuned LiNbO3 crystal pumped by a Nd:YAG laser. Improvements in fabrication techniques have resulted in LiNbO3 crystals up to 20 mm in diameter and 6 cm in length.

AD-A082 638/8 PC **A02**/MF **A01**
Lockheed Palo Alto Research Labs CA
Anodic Behavior of Lithium in Aqueous Electrolytes. IV. Influence of Temperature.
Final rept.
1979, 19p Rept no. LMSC/D633746
Contract N66604-78-M-8483

The rapid dissolution of Li in alkaline aqueous solutions can be utilized electrochemically to produce very high rate batteries. In the Li-H2O system, the rate-limiting process is the oxidation of lithium rather than the reduction of H2O at the cathode. A critical examination of the corrosion processes has revealed that the H2O e.r. at the Li surface is rate determining, not the Li dissolution reaction (1). Thus, unlike conventional battery systems, in Li-H2O cells the current efficiency is governed by the ratio of two competing reactions, namely, the anodic dissolution reaction and the parasitic self-corrosion reaction (2). The current efficiency increases as the electrode is polarized from its OCV, and it decreases at elevated temperatures where the corrosion reaction is stimulated. One of the most important features of the system is the fact that the maximum current (or limiting current) obtained during andodic polarization never exceeds the OCV corrosion rate. This unusual behavior and the impact of elevated temperature on the faradaic efficiency of the cell are examined in this paper. (Author

AD-A082 640/4 PC **A03**/MF **A01**
Wayne State Univ Detroit MI Research Inst for Engineering Sciences
Collisional Studies of Ionization Processes with Heavy Particle and Photon.
Final rept. 1 Aug 76-31 Oct 79,
Erhard W. Rothe, and Gene P. Reck. Jan 80, 30p ARO-14133.10-C
Grants DAAG29-78-G-0136, DAAG29-78-G-0125

This is the final report for Grant DAAG-29-78-G-0125, which has been a joint project with the Air Force. Advances in chemical dynamics are not usually achieved by a single experiment but rather by a blend of informations using a variety of techniques. As a consequence, the results of this research project may be classified in four separate categories: (a) preparation of and experiments with electronically excited atoms and molecules; (b) measurements of kinetic energy thresholds for ion-pair production from molecular collisions, with subsequent derivation of molecular binding energies and electron affinities; In experiments of type (a) electronically excited sodium was used to promote the chemi-ionization reaction with O2 and SO2. Two photon ionization of Na2 and Li2 was also studied in order to investigate laser selectivity.

AD-A082 642/0 PC **A02**/MF **A01**
Frank J Seiler Research Lab United States Air Force Academy CO
The Electrochemistry of Copper in a Room Temperature Acidic Chloroaluminate Melt.
Journal article,
C. L. Hussey, L. A. King, and R. A. Carpio. 19 May 78, 9p
Pub. in Jnl. of the Electrochemical Society, v126 n6 p1029-1034 Jun 79.

No abstract available.

AD-A082 643/8 PC **A02**/MF **A01**
Frank J Seiler Research Lab United States Air Force Academy CO
Vapor Pressure of Aluminum Chloride Systems. 2. Pressure of Unsaturated Aluminum Chloride Gas.
Journal article,
John T. Viola, Armand A. Fannin, Jr., Lowell A. King, and David W. Seegmiller. 26 May 77, 6p
Pub. in Jnl. of Chemical and Engineering Data, v23 n2 p118-122 1978. See also AD-A082 583.

No abstract available.

AD-A082 661/0 PC **A02**/MF **A01**
Chicago Univ IL James Franck Inst
Adsorption and Coadsorption with Oxygen of Xenon on the (110) and (100) Planes of Tungsten,
C. Wang, and R. Gomer. 13 Apr 79, 19p Rept no. 3
Contract N00014-77-C-0018
Pub. in Surface Science, v91 p533-550 1980.

No abstract available.

AD-A082 681/8 PC **A02**/MF **A01**
Ohio State Univ Columbus Dept of Chemistry
Electrocatalysis of Oxygen Reduction. Part II. Adsorbed Cobalt (III) Tetrapyridylporphyrin on Glassy Carbon Electrode,
Armand Bettelheim, Ray J. H. Chan, and Theodore Kuwana. 20 Feb 79, 9p AFOSR-TR-79-1338

Grant AFOSR-78-3672
Pub. in Jnl. of Electroanalytical Chemistry, v99 p391-397 1979.
Availability: Microfiche copies only.

No abstract available.

AD-A082 682/6 PC A03/MF A01
Brown Univ Providence RI Div of Engineering
Kinetic Effects in an Optically Excited Gas,
J. W. Cipolla, Jr., and T. F. Morse. 26 Apr 79, 27p AFOSR-TR-80-0123
Grant AFOSR-79-0052
Pub. in Jnl. of Quantitative Spectroscopy and Radiative Transfer, v22 n4 p365-388 1979. Prepared in cooperation with Northeastern Univ., Boston, MA. Dept. of Mechanical Engineering.

No abstract available.

AD-A082 767/5 PC A02/MF A01
Texas Univ At Austin Dept of Chemistry
An Electron Spectroscopy Study of Ammonia Adsorption on Clean and Oxidized Aluminum.
Technical rept.,
J. W. Rogers, Jr., C. T. Campbell, R. L. Hance, and J. M. White. 29 Feb 80, 25p Rept no. TR-12
Contract N00014-75-C-0922

Photoelectron spectra for ammonia adsorbed in submonolayer and multilayer amounts on clean and oxidized aluminum have been measured and interpreted. Uptake at 128K is dominated by weak molecular adsorption and saturates at submonolayer amounts whereas at 106K multilayers can be formed. On oxidized Al, as compared to clean, the saturation amount of adsorbed NH3 is larger and it is more tightly held. On clean Al, there is good evidence that NH3 tends to be physisorbed with the major bonding arising between the dipole of NH3 and the image dipole induced in the metal.(Author)

AD-A082 768/3 PC A02/MF A01
Texas Univ At Austin Dept of Chemistry
Photodecomposition of Water over Pt/TiO2 Catalysts.
Technical rept. 1 Apr 79-31 Mar 80,
S. Sato, and J. M. White. 15 Mar 80, 10p Rept no. TR-13
Contract N00014-75-C-0922

This report covers experiments demonstrating that the decomposition of water is catalytic at 23 C when a platinized, powdered titanium dioxide catalyst, illuminated with band-gap radiation, is used. (Author)

AD-A082 785/7 Not available NTIS
Materials Research Labs Ascot Vale (Australia)
Corrosion Rate Measurements by a Differential Pulse Method,
K. G. Boto, and L. F. G. Williams. 5 May 76, 5p
Availability: Pub. in Corrosion Science, v17 p917-921 1977 (No copies furnished by DTIC).

No abstract available.

AD-A082 787/3 Not available NTIS
Defence Research Establishment Valcartier (Quebec)
Carbon Dioxide Spectral Line Frequencies for the 4.3-micrometers Region,
P. L. Roney, F. D. Findlay, H. L. Buijs, M. W. P. Cann, and R. W. Nicholls. 8 Oct 77, 7p DRB-REPRINT-4217
Availability: Pub. in Applied Optics, v17 n16 p2599-2604, 15 Aug 78 (No copies furnished by DTIC).

No abstract available.

AD-A082 790/7 Not available NTIS
Royal Military Coll of Canada Kingston (Ontario) Dept of Chemistry and Chemical Engineering
Low Temperature Heat Capacity, Dielectric Constant, and Thermodynamic Properties of Solid Perchloryl Fluoride,
K. R. Mountfield, and R. D. Weir. 10 Sep 76, 8p DRB-REPRINT-4187
Availability: Pub. in Jnl. of Chemical Physics, v66 n2 p736-742, 15 Jan 77 (No copies furnished by DTIC).

No abstract available.

AD-A082 791/5 Not available NTIS
Royal Military Coll of Canada Kingston (Ontario) Dept of Chemical Engineering
Elevation of the Boiling Point of Water by Salts at Saturation: Data and Correlation,
David Meranda, and William F. Furter. 1 Nov 76, 4p DRB-REPRINT-4198
Availability: Pub. in Jnl. of Chemical and Engineering Data, v22 n3 p315-317 Jul 77 (No copies furnished by DTIC).

No abstract available.

AD-A082 803/8 PC A07/MF A01
Army Armament Research and Development Command Aberdeen Proving Ground MD Ballistics Research Lab
A Method for Computing the Flame Speed of a Laminar, Premixed, One Dimensional Flame.
Technical rept.,
T. P. Coffee, and J. M. Heimerl. Jan 80, 150p
ARBRL-TR-02212, AD-E430 386

A method of numerically solving the equations for a one-dimensional, premixed, laminar, steady state flame that propagates into an unbounded medium is described. Particular attention is given to the description of an adaptive grid, which concentrates gridpoints within the flame front. (Author)

AD-A082 815/2 PC A02/MF A01
Frank J Seiler Research Lab United States Air Force Academy CO
Density, Electric Conductivity, and Viscosity of Several N-Alkylpyridinium Halides and Their Mixtures with Aluminum Chloride.
Journal article,
Ronald A. Carpio, Lowell A. King, Richard E. Lindstrom, John C. Nardi, and C. L. Hussey. 12 Jun 78, 10p
Pub. in Jnl. of the Electrochemical Society, v126 n10 p1644-1650 Oct 79.

No abstract available.

AD-A082 822/8 PC A09/MF A01
Case Western Reserve Univ Cleveland OH Dept of Chemistry
Low Energy Electron Diffraction (LEED)-Auger-Thin-Layer Electrochemical Studies of the Underpotential Deposition of Lead onto Gold Single Crystals.
Technical rept.,
Patrick Lee Hagans, A. Homa, W. O'Grady, and E. Yeager. 15 Dec 79, 189p Rept no. TR-51
Contract N00014-75-C-0953
Doctoral thesis.

The underpotential deposition of lead onto very clean and well-ordered single crystal Au samples was studied with linear sweep voltammetry. The single crystal surfaces examined were (100), (110), (111) and (410). The (410) surface is a stepped surface with terraces of (100) orientation four atomic rows in width separated by steps of (100) orientation of monatomic height. The crystals were prepared in an ultra-high vacuum environment (equivalent to 10 to the minus 11th power Torr) by alternate cycles of argon-ion sputtering and annealing until the surfaces were clean within the limits of AES (Auger Electron Spectroscopy). (Author)

AD-A082 870/7 Not available NTIS
Calgary Univ (Alberta) Biopolymer Research Group
Infrared Spectra of Light and Heavy Meromyosin,
A. L. Jacobson, V. Vejdovsky, and P. J. Krueger. 3 Dec 73, 9p PUB-73-04, DRB-REPRINT-4076
Availability: Pub. in International Jnl. of Biochemistry, v5 p547-553 1974 (No copies furnished by DTIC).

No abstract available.

AD-A082 872/3 Not available NTIS
Royal Military Coll of Canada Kingston (Ontario) Dept of Chemical Engineering
Effects of Salts Having Large Organic Ions on Vapor-Liquid Equilibrium,
John A. Burns, and William F. Furter. 1976, 30p
Availability: Pub. in Advanced in Chemistry Series, n155: Thermodynamic Behavior of Electrolytes in Mixed Solvents, p99-127 1976 (No copies furnished by DTIC).

No abstract available.

AD-A082 884/8 PC A10/MF A01
Wright State Univ Dayton OH Brehm Lab
Collisional Excitation and Ionization.
Final rept. 1 Jul 75-30 Sep 79,
T. O. Tiernan. 30 Sep 79, 214p AFOSR-TR-80-0260
Contract F44620-76-C-0007

Ion-scattering apparatuses were utilized to investigate the kinetics, dynamics and energy transfer characteristics of selected positive- and negative-ion neutral reactions. Thresholds for endothermic electron transfer reactions involving O3, N2O, CO2, and other atmospheric molecules were determined, and these data were used to determine electron affinities of these species. Similarly, thresholds for collision-induced dissociation reactions of O3, CO3, NO3 ions, and other atmospheric negative ions were determined, and ionic bond dissociation energies, heats of formation and electron affinities were derived from these results.

AD-A082 891/3 PC A02/MF A01
IBM Research Lab San Jose CA
Theory of Electronic, Atomic, and Molecular Calculations,
Robert K. Nesbet. Mar 80, 7p Rept no. TR-1
Contract N00014-79-C-0406

The general approach is to develop computational methods that are quantitative in the sense of being based on the exact formal theory of the processes considered, and are practicable, in the sense of being capable of implementation on digital computers at the present level of technology. For atom-molecule scattering, a new method is being developed that extends a recent theory of the action constants of nonseparable dynamical systems to collision problems. For electron-molecule scattering, a new method for treating vibrational and rotational excitation has been developed. formal theoretical relations needed in detailed applications of this method are being derived, and a new variational approach to quantitative fixed-nuclei calculations is being planned for practical implementation. (Author)

AD-A082 896/2 PC A02/MF A01
Frank J Seiler Research Lab United States Air Force Academy CO
A MINDO/3 Study of Nitrobenzene.
Journal article,
Larry P. Davis, and R. Martin Guidry. 22 Jun 78, 7p
Pub. in Australian Jnl. of Chemistry, v32 p1369-1374 1979.

No abstract available.

AD-A082 939/0 PC A02/MF A01
IRT Corp San Diego CA
Molecular Beam Studies of Low Energy Reactions.
Final rept. 1 Sep 73-31 Jan 80,
R. H. Neynaber, and S. Y. Tang. 31 Mar 80, 15p Rept no. IRT-8103-010
Contract N00014-74-C-0011

A summary of research performed under ONR Contract No. N00014-74-C-0011 is given. The contract covered the period 1 Sept. 1973-31 Jan. 1980. The report describes merging and crossed-beams studies of chemi-ionization and/or ion-molecule reactions. Included are investigations of the Ne(plus) -Ar, Ne(plus) -Kr, Ne(plus) -Xe, He(plus) -D, Ar(plus) -Na, He(plus) -He(plus), He(plus) -Ne(plus), Ar(plus) -Kr(plus), and He(plus) -Ne(plus) systems. (Author)

AD-A082 942/4 PC A02/MF A01
Ben-Gurion Univ of the Negev Beersheba (Israel) Dept of Chemistry
Preferential Energy Transfer from N2(A) to Specific Energy Levels of Cu Atoms.
I. Nadler, and S. Rosenwaks. 27 Sep 79, 8p
Grant AFOSR-78-3718
Pub. in Chemical Physics Letters, v69 n2 p266-269, 15 Jan 80.

No abstract available.

AD-A082 945/7 PC **A02/MF A01**
California Univ San Diego La Jolla Dept of Chemistry
Analytic Theory of Extrema. III. Results for Master Equations with Application to Unimolecular Decomposition,
V. Seshadri, Bruce J. West, and Katja Lindenberg. 14 Aug 79, 7p
Contract N00014-78-C-0497
Pub. in Jnl. of Chemical Physics, v72 n2 p1145-1150, 15 Jan 80. See also AD-A082 946.

No abstract available.

AD-A082 946/5 PC **A02/MF A01**
California Univ San Diego La Jolla Dept of Chemistry
Analytic Theory of Extrema. IV. Relaxation from Metastable and Unstable States,
Bruce J. West, Katja Lindenberg, and V. Seshadri. 14 Aug 79, 6p
Contract N00014-78-C-0497
Pub. in Jnl. of Chemical Physics, v72 n2 p1151-1155, 15 Jan 80. See also AD-A082 945.

No abstract available.

AD-A082 986/1 PC **A06/MF A01**
Pennsylvania State Univ University Park Applied Research Lab
Scattering of Low Energy Helium Beams from Clean Surfaces of Sodium Fluoride, Lithium Fluoride, and Graphite.
Technical memo.,
Gregory Neil Derry. 13 Dec 79, 117p Rept no. ARL/PSU/TM-79-220
Contract N00024-79-C-6043

An examination of helium beam scattering from the basal plane of graphite and from (001) surfaces of two alkali halide crystals is presented. Results are given for both (4)He and (3)He. Incident beam energies used range from 2.9 meV to 17.3 meV, chosen to probe the physisorption regime. Bound state energy levels are measured for (4)He and (3)He adsorbed on graphite, NaF and LiF. Matrix elements of the atom-surface potential Fourier components are measured for (4)He on graphite and LiF. A brief discussion of how this information is used to determine the details of the gas-atom - solid surface interaction is given. In the case of (4)He and (3)He on graphite, comparison is made with thermodynamic adsorption data for submonolayer films and excellent agreement is found. Resonance lineshapes are studied for (4)He scattering from LiF and from graphite as the incident angles and energy are varied. The LiF results are seen to agree well with recent theoretical predictions. For graphite, some phenomena exhibit conformance to elastic theory while others appear to contradict it. Experimental evidence that the latter are due to inelastic scattering mechanisms is presented. (Author)

BETC/RI-79/3 PC **A02/MF A01**
Department of Energy, Bartlesville, OK. Bartlesville Energy Technology Center.
Effect of Temperature and Sulfonate Concentration on Calcium Tolerance.
M. J. Meister, C. A. Wilson, and A. G. Collins. Jan 80, 16p

Calcium tolerance of these sulfonates increases as temperature or sulfonate concentration increases. Above 2 wt % sulfonate, tolerance increases as the logarithm of sulfonate concentration. The fraction of sulfonate (CB 450 at 30 exp 0 C) neutralized by calcium is not the same in the precipitate as in the supernatant solution. In either case, the rest of the sulfonate is neutralized by sodium. These fractions also vary as the total sulfonate concentration changes and as precipitation proceeds. Before much precipitation has occured, the precipitate fraction reaches a minimum and solution viscosity a corresponding maximum. (ERA citation 05:009633)

CONF-780421- PC**$15.00**
Computers in Activation Analysis and gamma-Ray Spectroscopy.
B. S. Carpenter, M. D. D'Agostino, and H. P. Yule. 1979, 905p
Conference on computers in activation analysis and gamma-ray spectroscopy, Mayaguez, Puerto Rico, 30 Apr 1978.

Seventy-three papers are included under the following session headings: analytical and mathematical methods for data analysis; software systems for gamma -ray and x-ray spectrometry; gamma -ray spectra treatment, peak evaluation; least squares; IAEA intercomparison of methods for processing spectra; computer and calculator utilization in spectrometer systems; and applications in safeguards, fuel scanning, and environmental monitoring. Separate abstracts were prepared for 72 of those papers. (ERA citation 05:013936)

COO-1198-1283 PC **A12/MF A01**
Illinois Univ., Urbana. Dept. of Physics.
Studies in the Theory of Solids.
H. P. Hjalmarson. 1979, 263p
Contract EY-76-C-02-1198
Thesis.

The surface arrangement of atoms in a solid controls the energetically slowly varying features of a LEED spectrum. Because of inelastic collisions within the solid, the LEED electrons mainly sample a surface sandwich of atoms. Thus, the surface sandwich reflectivity, computed by using a method which considers only single reflections of the electron by sheets of atoms in the solid, can be directly compared with the slowly varying, surface dependent features in the data. The method was used to determine that the surface of TiS sub 2 is ideal whereas the surface sandwich of TiSe sub 2 expands outward slightly. For the final determinations, the smoothing method was used on both the data and a theory which includes multiple scattering to confine the comparison to just the slowly varying surface dependent features. Energies of deep traps associated with impurities in semiconductors are shown to be controlled by the S and P orbital energies of the impurity atoms. First, the qualitative physics of a deep trap is worked out using a defect molecule model. The quantitative theory is worked out using a tight binding Koster-Slater calculation. Predictions of energies of deep traps caused by impurities are made for fourteen different semiconductors. The theory is compared with the data for GaP and the alloy GaAs/sub 1-x/ P/sub x/ before developing a phenomenological model which depends mainly on the energy centers of the valence and conduction band density of states as well as atomic energies of impurities. This phenomenological model is used to make predictions of deep trap energies in Si. (ERA citation 05:010714)

COO-2640-11 PC **A02/MF A01**
Minnesota Univ., Minneapolis.
Reactions of Ions with Atomic and Molecular Free Radicals. Progress Report, May 1, 1979-April 30, 1980.
W. R. Gentry. Jan 80, 9p
Contract EY-76-S-02-2640

A very detailed study of the microscopic dynamics of the reaction D sub 2+ + F(exp 2 p) implies FD exp + + D, over the range of relative kinetic energy from 0.001 eV to 25 eV is reported. At very low collision energy, the total reaction cross section is governed by long-range forces - principally the charge-quadrupole interaction, which favors reactions on PI-type potential energy surfaces in the covalent interaction region. At high collision energies, a clear transition to reactions on a strongly repulsive potential energy surface is observed. The change in reaction dynamics is evident from the shape of the energy dependence of the total reaction cross section, and from a shift in the product angular distribution from 0 exp 0 toward 180 exp 0 in the center-of-mass coordinate system. (ERA citation 05:012713)

COO-2887-103 PC **A02/MF A01**
Harvard Coll. Observatory, Cambridge, MA.
Theoretical Studies of Highly Ionized Species. Progress Report, March 1, 1979-February 28, 1980.
A. Dalgarno, and G. A. Victor. Nov 79, 8p
Contract EY-76-S-02-2887

Applications were continued of the relativistic random phase approximation and of the model potential method and the properties of highly stripped ionic systems were calculated. Charge transfer recombination and ionization were identified as important processes in plasmas and calculations were performed of rate coefficients for several systems at thermal energies. A theory was constructed of collision-induced fine-structure transitions involving protons and the interaction potentials for O exp 3+ - H exp + were calculated. A study was made of some of the processes that occur when lithium and sodium are subject to laser radiation. Some progress was made towards the development of methods for calculating the effects on atomic systems of intense electric and magnetic fields. (ERA citation 05:012714)

COO-2944-T1 PC **A02/MF A01**
Wright State Univ., Dayton, OH. Dept. of Chemistry.
Resonance Absorption Measurements of Atom Concentrations in Reacting Gas Mixtures. 5. Pyrolysis of C sub 3 H sub 8 and C sub 3 D sub 8 Behind Shock Waves.
C. Chiang, and G. B. Skinner. 1979, 18p
Contract EY-76-S-02-2944

Dilute mixtures (5-100 ppM) of C sub 3 H sub 8 and of C sub 3 D sub 8 in argon were pyrolyzed behind reflected shock waves at temperatures of 1200 to 1450 exp 0 K and total pressures of 2-3 atmospheres. Progress of the reaction was followed by analysis for H or D atoms using resonance absorption spectroscopy. Rate constants were determined as follows: C sub 3 H sub 8 implies CH sub 3 + C sub 2 H sub 5 , k sub 1 = 2.5 x 10 exp 16 exp(-87,500/RT) s exp -1 ; C sub 3 H sub 8 + Ar implies CH sub 3 + C sub 2 H sub 5 + Ar, k/sub 1a/ = 2.6 x 10 exp 21 exp(-89,900/RT) mole exp -1 cm exp 3 s exp -1 ; where activation energies are in calories. Within experimental error, rate constants for the dissociation of C sub 3 D sub 8 were the same. 2 figures, 2 tables. (ERA citation 05:012269)

COO-2944-T2 PC **A02/MF A01**
Wright State Univ., Dayton, OH. Dept. of Chemistry.
Absorption of H and D Lyman- alpha Radiation by O sub 2 Molecules at High Temperatures.
C. C. Chiang, and G. B. Skinner. 1979, 12p
Contract EY-76-S-02-2944

Absorption cross sections of molecular oxygen were measured at the H and D Lyman- alpha wavelengths (1215.67 and 1215.34A) between 800 and 1700 K, the cross sections being given by the equation sigma(cm exp 2) = 4.2E-18 exp (-3070/T). The absorption cross section for v = 1 is 9E-19 cm exp 2 and that for v = 2 is 7E-18 cm exp 2 , compared to 1E-20 cm exp 2 for v = 0. Vibrational relaxation times were in agreement with literature data over the range of common temperatures. (ERA citation 05:012715)

COO-3283-28 PC **A02/MF A01**
Johns Hopkins Univ., Baltimore, MD.
Studies in Hot Atom and Radiation Chemistry. Progress Report, December 1, 1978-November 30, 1979.
W. S. Koski. Sep 79, 21p
Contract EY-76-S-02-3283

The cross section for the reaction Cl exp + (CO,O)CCl exp + was measured over an energy range from threshold to 18 eV in the center of mass system using a tandem mass spectrometer. The threshold value yielded a heat of formation of CCl exp + of 15.7 +- 0.1 eV. The angular and energy distribution of the ionic products from the reaction B exp + (exp 3 P/sub u/) + D sub 2 was also studied at 1 to 40 eV. The product states as determined from the limiting values of the translation exergicity were BD exp + (exp 2 sigma exp +) and BD exp + (exp 2 pi). Velocity contour maps indicated that the former product was probably arising through complex formation whereas the latter was proceeding by a direct mechanism. Work on the reaction Br exp + (D sub 2 ,D)BrD exp + was initiated; both the ground state exp 3 P and the first excited electronic state (exp 1 D) reactions are being measured. Work was also initiated on the Br-ethane hot atom system. Inelastic and superelastic collisions between rare gas atoms and halogen ions are being investigated. The charge distribution of exp 13 N produced by the reaction exp 12 C(d,n) exp 13 N over a deuteron energy range of 2.5 MeV to 14 MeV has been measured. (ERA citation 05:012262)

COO-4227-8 PC **A02**/MF **A01**
Chicago Univ., IL.
Coal Anion Structure and Chemistry of Coal Alkylation. Eighth Quarterly Progress Report, December 1, 1978-February 28, 1979.
L. M. Stock. 1979, 24p
Contract EF-77-S-02-4227

Three areas of research are discussed in this report. First, work on the reactions for the formation of soluble alkylated products is discussed. Second, the spectroscopic properties of the alkylated products are discussed. Third, the nature of the reaction between tetralin-d sub 12 and coal at 400 exp 0 is examined. (ERA citation 05:012235)

COO-4264-10 PC **A02**/MF **A01**
Pennsylvania State Univ., University Park.
Effect of Correlation in the 3D/Sup n/ Core on the Resonance Transition in Cu II.
C. F. Fischer, and R. Glass. 1979, 6p CONF-7906128-3
Contract EG-77-S-02-4264
46. Nobel symposium on many-body theory of atomic systems, Aspenasgarden, Lerum, Sweden, 11 Jun 1979.

A preliminary report is presented on the effect of correlation in the 3d/sup n/ core on the 3d exp 10 exp 1 S implies 3d exp 9 4p exp 1 P f value by use of the multiconfiguration (MC) Hartree-Fock procedure. A common orbital basis was used for correlation in the core, with virtual orbitals determined variationally for the initial state. Three different approximations were used: a single-configuration approximation for both initial and final state, a MC approximation for 3d exp 10 correlation in the initial state and a single configuration for the final state, and MC approximations for both initial and final states. Some preliminary f values for the 3d exp 10 exp 1 S implies 3d exp 9 4p exp 1 P transition are tabulated. Comparison of calculated with experimental values indicates that correlation in the 3d exp 9 core of the final state is needed to obtain the correct transition energy to bring the length and velocity forms into good agreement with themselves and experiment, and that the multiplet strength for the transition is not greatly affected by correlation. 1 table. (ERA citation 05:014456)

COO-4264-12 PC **A02**/MF **A01**
Pennsylvania State Univ., University Park. Dept. of Computer Science.
Some MCHF Results for Rydberg States.
C. F. Fischer, and J. E. Hansen. 1979, 2p CONF-790997-2
Contract EG-77-S-02-4264
SAS-79 symposium on atomic spectroscopy, Tuscon, AZ, USA, 10 Sep 1979.

The multiconfiguration Hartree-Fock method (MCHF) was applied to a study of the 3s nd, n = 4 to 8, states in the exp 3 F exp 0 series of Al II with the well-known 3p 3d perturber. Procedures were devised to stabilize the calculation in the presence of strong interactions with a perturber and facilitate the calculation for a series. Basis states of the type 3s nf, pd, df, and pg were included. Excellent agreement was achieved with the statistically weighted observed energy relative to the ionization limit, except in the vicinity of the perturber. These calculations are compared with MQDT results of other authors. (ERA citation 05:014457)

COO-4264-6 PC **A02**/MF **A01**
Pennsylvania State Univ., University Park. Dept. of Computer Science.
Oscillator Strengths and Transition Probabilities for the Intercombination Transitions in Fe XXII.
R. Glass. 1979, 19p
Contract EG-77-S-02-4264

Oscillator strengths and transition probabilities are evaluated for the intercombination transitions between the 2s exp 2 2p, 2s 2p exp 2 and 2p exp 3 states of Fe XXII using configuration interaction wavefunctions. The fine-structure splittings have also been calculated. Some significant differences with previous calculations are obtained. (ERA citation 05:012718)

COO-4264-9 PC **A03**/MF **A01**
Pennsylvania State Univ., University Park. Dept. of Computer Science.
Theoretical Energy Levels of exp 3 F exp 0 Rydberg Series for Mg I, Al II, and Si III.
C. F. Fischer. 1979, 31p CONF-7906128-2
Contract EG-77-S-02-4264
46. Nobel symposium on many-body theory of atomic systems, Aspenasgarden, Lerum, Sweden, 11 Jun 1979.

A multiconfiguration Hartree-Fock procedure for excited states is described and applied to states of the Rydberg series up to 3s 8f exp 3 F exp 0 in Mg I, Al II, and Si III. Energies relative to the ionization limit agree with observation to within 1%, an exception being the case of near-degeneracy in Al II, where a discrepancy of 2.5% occurs. Systematic errors are observed. Some possible sources of errors are considered. 2 figures, 6 tables. (ERA citation 05:014455)

COO-4320-2 PC **A03**/MF **A01**
Massachusetts Inst. of Tech., Cambridge. Dept. of Chemistry.
Analytical Chemical System for the Determination of Heavy Metals and Organic Compounds. Annual Progress Report, December 1, 1978-November 30, 1979.
S. Siggia, and R. M. Barnes. 24 Oct 79, 49p
Contract EE-77-S-02-4320

Progress has been made in the synthesis and characterization of new resins for sequestering inorganic and organic compounds. The capabilities of the poly(dithiocarbamate) resin have been extended, a new poly(acrylamidoxime) resin prepared and characterized, and a series of resins for organic compounds prepared and tested. Limited actual sample analyses have been performed with these resins. A new inductively coupled plasma source, spectrometer, and computer system have been received and they are undergoing tests and installation. With this system in place, the multielement analysis of metals during the forthcoming period will insure the application of sequestering resins to practical analysis of energy-related materials. An automated sample handling and data system has been designed, some components purchased, and construction is scheduled for 1980. (ERA citation 05:012216)

EGG-PHYS-5058 PC **A04**/MF **A01**
Idaho National Engineering Lab., Idaho Falls.
Liquid Scintillation alpha Particle Spectrometry. Progress Report.
L. L. Bell, S. A. Hakooz, L. O. Johnson, E. B. Nieschmidt, and D. H. Meikrantz. Dec 79, 72p
Contract EY-76-C-07-1570

Objective to develop a technique whereby Pu may be put into solution, extracted by solvent extraction into a suitable extractive scintillant and subsequently counted. Presented here are results of attempts to separate beta and alpha activities through pulse shape discrimination. A qualitative discussion is given which yields alpha particle peak widths, resolution and response. The detection efficiency for alpha particles in a liquid scintillant is 100%. Present detection sensitivities of the equipment being used are: 4.5 x 10 exp -6 mu Ci (100 s), 1.2 x 10 exp -6 mu Ci (1000 s), and 4.0 x 10 exp -7 mu Ci (10,000 s) at the 3 sigma level. The detectability of a particular alpha-emitting species is strongly dependent upon the population of other species. The ability to discriminate depends upon the system resolution. 14 figures, 2 tables. (ERA citation 05:013951)

EMSL-LV-0539-29 PC **A07**/MF **A01**
Environmental Monitoring Systems Lab., Las Vegas, NV.
Neptunium: A Bibliographic Reference.
R. E. Mosley. Jun 79, 127p
Contract EY-76-A-08-0539

A comprehensive bibliograhy of the literature on the element neptunium published prior to January 1976 is presented. A short abstract is given for each listed reference, with a few exceptions. The references are divided into sections categorized as General, Man-Made Sources (Reactors), Man-Made Sources (Fuel Reprocessing), Chemistry (Solubility), Chemistry (Compounds), Chemistry (Isotopes), Analyses (Instrumental), Analyses (Chemical), Chemical (Animal), Biological (Effects), Biological (Animal-Metabolism-Retention), Biological (Air Movement), Biological (Human Inhalation), Measurement, and Dosimetry. The bibliography contains author and keyword indexes and was compiled to serve as a quick reference source for neptunium-related work. 184 citations. (ERA citation 05:013997)

EMSL-LV-0539-30 PC **A07**/MF **A01**
Environmental Monitoring Systems Lab., Las Vegas, NV.
Curium: A Bibliographic Reference.
May 79, 143p
Contract EY-76-A-08-0539

A comprehensive bibliography of the literature on the element curium published prior to January 1976 is presented. A short abstract is given for each listed reference, with a few exceptions. The references are divided into sections categorized as General, Man-Made Sources (Reactors), Man-Made Sources (Fuel Reprocessing), Chemistry (Solubility), Chemistry (Compounds), Chemistry (Isotopes), Analyses (Instrumental), Analyses (Chemical), Chemical (Animal), Biological (Effects), Biological (Animal-Metabolism-Retention), Biological (Air Movement), Biological (Human Inhalation), Measurement, and Dosimetry. The bibliography contains author and keyword indexes, and was compiled to serve as a quick reference source for curium-related work. 185 citations. (ERA citation 05:013998)

GEPP-TIS-470 PC **A02**/MF **A01**
General Electric Co., St. Petersburg, FL. Neutron Devices Dept.
Cyanide Evolution from a Potassium Gold Cyanide Plating Bath.
R. J. Antepenko. 12 Feb 80, 12p
Contract EY-76-C-04-0656

When a gold plating console was installed in a production area at the General Electric Neutron Devices Department (GEND), the console was placed adjacent to a 10% H sub 2 SO sub 4 activation bath. An experiment was made to measure the amount of hydrogen cyanide gas released as a result of the accidental addition of sulfuric acid to the gold bath. Similar hydrogen cyanide gas evolution data were obtained from the addition of either dilute sulfuric acid or concentrated sulfuric acid. Results show hydrogen cyanide gas release was a function of the plating bath pH. Air samples collected over a portion of the gold bath at pH 5.6 and at either room temperature or at a 70 exp 0 C operating temperature were found to contain 2 mu g/1 hydrogen cyanide. Air samples collected over the bath sample at pH 4.1 to 4.3 contained 40 mu g/1 hydrogen cyanide. A rapid increase in hydrogen cyanide was found in air samples collected over plating bath samples below pH 2.5. A quantity of reagent grade concentrated sulfuric acid was added to the test bath, which was equivalent to the addition of a 9-pound bottle of the acid to the 30-gallon production bath. Air samples were found to contain 1400 mu g/1 of hydrogen cyanide. (ERA citation 05:013979)

GJBX-4(80) PC **A04**/MF **A01**
Bendix Field Engineering Corp., Grand Junction, CO.
High Resolution gamma-Ray Spectroscopy Applied to Bulk Sample Analysis.
K. L. Kosanke, C. D. Koch, and R. D. Wilson. Jan 80, 62p
Contract EY-76-C-13-1664

A high resolution Ge(Li) gamma-ray spectrometer has been installed and made operational for use in routine bulk sample analysis by the Bendix Field Engineering Corporation (BFEC) geochemical analysis department. The Ge(Li) spectrometer provides bulk sample analyses for potassium, uranium, and thorium that are superior to those obtained by the BFEC sodium iodide spectrometer. The near term analysis scheme permits a direct assay for uranium that corrects for bulk sample self-absorption effects and is independent of the uranium/radium disequilibrium condition of the sample. A more complete analysis scheme has been developed that fully utilizes the gamma-ray data provided by the Ge(Li) spectrometer and that more properly accounts for the sample self-absorption effect. This new analysis scheme should be implemented on the BFEC Ge(Li) spectrometer at the earliest date. (ERA citation 05:013952)

HEDL-SA-1880 PC **A02**/MF **A01**
Hanford Engineering Development Lab., Richland, WA.
Chemical Decontamination of Metals.
J. A. Partridge, and R. E. Lerch. Oct 79, 22p
CONF-791103-66
Contract EY-76-C-14-2170
American Nuclear Society meeting, San Francisco, CA, USA, 12 Nov 1979.

A metal decontamination process based upon removal of contamination by treatment with a cerium (IV)-nitric acid solution (or other redox agent in nitric acid) is feasible and highly promising. The technique is effective in dissolving the surface layer of stainless steel. Dissolution rates of approximately 1.5 mils/h were demonstrated with cerium (IV)-nitric acid solutions. Removal of plutonium contamination from stainless steel was demonstrated in laboratory tests, in which activity levels were reduced from greater than 5 x 10 exp 5 counts per minute to nondetectable levels in approximately one hour at 90 exp 0 C. Removal of paint from stainless steel surfaces was also demonstrated. Advantages of this process over other chemical solutions include: (1) The solutions are not high salt systems; therefore, there is potentially less waste generated. (2) Cerium(IV) in nitric acid is a good dissolution agent for plutonium oxide. (3) Regeneration of Ce(IV) during the decontamination is accomplished by electrolysis. (4) The process should be effective for irregularly shaped equipment. (5) It could be effective as a spray or a flow-through system. 13 figures. (ERA citation 05:012264)

HU-TFT-78-19 PC **A06**/MF **A01**
Helsinki Univ. (Finland). Research Inst. for Theoretical Physics.
Electron Liquid in Collection Description. III. Positron Annihilation.
J. Arponen, and E. Pajanne. May 78, 120p
U.S. Sales Only.

A new, computationally effective, formulation for the problem of a charged impurity in an interacting electron gas is given. The approach is based on the previously introduced formalism in which the collective excitations of the electron system are represented by interacting bosons. This enables one to include in a logical way the most important terms of the electron-electron interaction beyond the random phase approximation (RPA). The numerical application to positron annihilation shows that the added non-RPA terms remove from the annihilation rate lambda and the correlation energy E the divergences, which have troubled the earlier theories. The rate lambda and the energy E are both continuous functions of the electron density and approach their correct limiting values for low densities. The numerical values of lambda at physical densities correspond closely to the measured positron lifetimes in metals. A very noteworthy characteristic of the present theory is that the sum rule for the displaced charge is fulfilled typically to the accuracy of 1 %. Numerical results are also given for the positron kinetic energy, the various components of the positron correlation energy, the pair-correlation function, the electrostatic potential as well as the positron momentum probability distribution at various electron densities. (Atomindex citation 10:474694)

HU-TFT-78-31 PC **A02**/MF **A01**
Helsinki Univ. (Finland). Research Inst. for Theoretical Physics.
Electron Liquid in Collective Description. IV. Proton in an Electron Gas.
J. Arponen, and E. Pajanne. 1978, 22p
U.S. Sales Only.

The boson formalism is applied to treat the problem of a proton in an interacting electron gas. Numerical results for the relaxation energy and the proton momentum probability distribution as well as for the induced charge density around the proton are presented. The results for the relaxation energy are lower and for the induced electron densities higher than those obtained earlier by the density-functional formalism. The energy forms a monotonous function of the density parameter rsub(s) and for high rsub(s) approaches the correct limiting value, i.e. the ground-state energy of the negative hydrogen ion. This limiting energy is obtained with the accuracy of 0.1 %. (Atomindex citation 10:474693)

INEL-tr-43 PC **A02**/MF **A01**
Determination of Traces of Impurities in Beryllium and Uranium by Spark Mass Spectrometry.
R. Bourguillot, A. Cavard, A. Cornu, and R. Stefani. Jun 67, 7p
Contract W-7405-ENG-82
A, Chim. Anal. (Paris), 49 n6 P315-319 Jun 1967.

Spark mass spectrometry allows analysis of traces in metals in the range of parts per million. It has been successfully applied to very different metals, such as beryllium and uranium, and produces, without a standard, a semi-quantitative determination of all the impurities. For some elements comparison with other analytical methods produced sensitivity coefficients which allow improvement of the accuracy of the results. (ERA citation 05:013949)

INIS-mf-5241 PC **A06**/MF **A01**
Technische Hogeschool, Delft (Netherlands).
Rotational Motion of Molecules and Molecular Groups in the Solid State Studied by Neutron Scattering.
C. Steenbergen. 21 Feb 79, 119p
Proefschrift (Dr.).
U.S. Sales Only.

The reorientational motions of different molecular groups and of a globular molecule in their solid phases have been investigated in incoherent neutron scattering studies. These groups include the methyl group in (CH sub 3) sub 2 SnF sub 2 , Si(CH sub 3) sub 4 , Ge(CH sub 3) sub 4 and Sn(CH sub 3) sub 4 and NH sub 4+ ions in NH sub 4 ZnF sub 3 . From the neutron spectra of 1,4-dimethoxy-2,6-dimethylbenzene values for the torsional transitions of the different methyl groups have been determined. A rough estimate of the residence times in the torsional potentials of the groups can also be given. A comparison of these data with results from NMR investigations is presented. It appears that the threshold barriers to reorientation determined from solid state NMR and neutron scattering agree well. For one particular methyl group evidence is given for a potential shape differing from the pure threefold cosine shaped one. (Atomindex citation 10:483283)

ISM-251 PC **A02**/MF **A01**
Ames Lab., IA.
Lattice Gas Model for the Metal-Electrolyte Interface.
S. H. Liu. 1979, 17p CONF-790956-3
Contract W-7405-ENG-82
Conference on non-traditional approaches to the study of the solid-electrolyte interface, Snowmass, CO, USA, 23 Sep 1979.

A lattice model is proposed for the physical properties of the metal-electrolyte interface. It is shown that near the electrode where the potential and the electric field are very high, the continuum model of Gouy and others breaks down, but the lattice model gives a physically reasonable description of the properties of the electrolyte in the interface region. (ERA citation 05:012246)

ISM-253 PC **A03**/MF **A01**
Iowa State Univ., Ames. Dept. of Chemical Engineering.
Simulation of Chemical Reaction in a Turbulent Flow.
J. C. Hill. 1979, 28p CONF-7903109-1
Contract W-7405-ENG-82
Chemical engineering research symposium, Ames, IA, USA, 8 Mar 1979.

The mass conservation equations for chemical species undergoing convection, diffusion, and irreversible chemical reaction were numerically integrated over time using a numerical simulation of two-dimensional, homogeneous, turbulent velocity fields with assignable statistical properties. Statistical independence hypotheses that had been proposed by O'Brien for single-species reactions and by Toor for two-species reactions were tested by comparing exact statistical quantities during evolution of the concentration fields. (ERA citation 05:014035)

ISM-255 PC **A03**/MF **A01**
Ames Lab., IA.
Mixed-Valency in Discrete and Condensed Transition Metal Cluster Species with Classical Ligands.
R. E. McCarley. 1979, 42p CONF-7909117-1
Contract W-7405-ENG-82
NATO-ASI on mixed valence compounds in chemistry conference, Oxford, UK, 10 Sep 1979.

This paper summarizes and illustrates structural and bonding features of mixed-valence cluster compounds with emphasis on most recent developments. All cluster types from dimers through units with twelve metal atoms are surveyed among compounds with discrete cluster units. Some principles also are discussed relating extended, metal-metal bonded systems to the condensation of cluster units. Condensation of octohedral cluster units to form infinite chains, sheets and three dimensional metal-metal bonded systems is viewed from the perspective of the sharing of metal atoms on corners, edges and faces between adjacent units in the condensed systems. 74 references, 11 figures, 4 tables. (ERA citation 05:013980)

JINR-E-2-11503 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Theoretical Physics.
Parity Violation Effects in Heavy Atoms and the Sign of the Weak Coupling Constant.
S. M. Bilenky, G. Motz, and S. T. Petcov. 1978, 9p
U.S. Sales Only.

Parity violation effects in heavy atoms are considered in the framework of the SU(2) invariant four-fermion theory. The parameter which characterises the parity nonconservation is determined in this theory by the anapol momentum of the electron and the sign of the Fermi constant. It is shown that the measurement of the magnitude of the parity violation effects for two different heavy atoms would make possible the determination of both these quantities. (Atomindex citation 10:474559)

JINR-E-4-11984 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Theoretical Physics.
Schwinger Variational Principle in the Quantum-Mechanical Three-Body Problem.
A. P. Podkopaev, A. I. Subarev, and J. Wrzecionko. 1978, 17p
U.S. Sales Only.

The Schwinger variational principle (SVP) is applied to problems of atomic (e exp + H scattering), mesoatomic (p-d mu) scattering) and nuclear (pion-deuteron scattering) physics. The convergence of the Schwinger variational iterative method is investigated. It is shown that in some cases there occurs a pathological convergence. It means that the iterative procedure is convergent, but not to the exact solution. The method of strong coupling of channels is reformulated on the basis of SVP; it permits the summation over all closed channels. The obtained equations are applied to the calculations of the low energy scattering parameters of the following processes: e exp + H implies e exp + H; pi d implies pi d. The dependence on pi N scattering lengths and effective ranges is investigated. It is shown that the contribution of closed channels to the pi exp - d scattering length is 30 percent. (Atomindex citation 10:467289)

KFK-2613 PC **A03**/MF **A01**
Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Inst. fuer Heisse Chemie.
Routine Analytical Determination of di- and Tributylphosphate in PUREX-Process Solutions.
L. Stieglitz, R. Becker, H. Bautz, and A. Wuenschel. Mar 78, 27p
In German.
U.S. Sales Only.

Determination of the extractant tributylphosphate and its main degradation product dibutylphosphate is necessary for a control of solvent- and raffinate streams. These analyses must be carried out with samples, which contain - depending on their origin - various amounts of uranium, plutonium, fission products and nitric acid. For dibutylphosphate the concentration range is between 5 and 500 mg/l. The analysis of TBP must cover a very wide range: depending on the efficiency of the raffinate wash,

aqueous systems may contain 5 to 300 mg TBP/l; in a mixture with n-alkanes concentrations of 200 - 300 g TBP/l must be analyzed. A procedure is described, which can be easily adapted to the respective problem: Dibutylphosphate is separated from the interfering matrix by a simple extraction process and, after methylation, is measured by a standardised, automated gas chromatography. Depending on the concentration, TBP is measured by gas chromatography either directly or after an enrichment by extraction. For the range from 5 to 500 mg/l both organophosphates are analyzed with recovery rates of 93 - 100% and variation coefficients from exp +- 1% to exp +- 5%. (Atomindex citation 09:416951)

LA-7756-MS PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
Atom Positions of Pentaerythritol Tetranitrate (PETN, C Sub 5 H sub 8 N sub 4 O sub 12) Determined by X-Ray and by Neutron Diffraction.
J. W. Conant, H. H. Cady, R. R. Ryan, J. L. Yarnell, and J. M. Newsam. Dec 79, 17p
Contract W-7405-ENG-36

Booth and Llewellyn determined the crystal structure of PETN in 1947. Their structure, refined by Trotter in 1963, agrees essentially with ours, which was constructed with new intensity data taken using a Picker FACS-I computer-controlled diffractometer. Our refinement located the hydrogen atoms with reasonably accuracy because our diffractometer is more sensitive than the film data of the earlier workers. A powder neutron diffraction pattern of deuterated PETN was taken on the diffractometer at the Omega West Reactor at the Los Alamos Scientific Laboratory. These intensity data were refined using the Rietveld Profile Analysis program as modified by R. Von Dreele of Arizona State University. We discuss possible explanations of systematic differences between the interatomic distances and angles determined by x-ray diffraction and those determined by neutron diffraction. (ERA citation 05:012237)

LA-7981 PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
Gravimetric Determination of Carbon in Uranium-Plutonium Carbide Materials.
H. J. Kavanaugh, J. W. Dahlby, and A. P. Lovell. Dec 79, 12p
Contract W-7405-ENG-36

A gravimetric method for determining carbon in uranium-plutonium carbide materials was developed to analyze six samples simultaneously. The samples are burned slowly in an oxygen atmosphere at approximately 900 exp 0 C, and the gases generated are passed through Schuetze's oxidizing reagent (iodine pentoxide on silica gel) to assure quantitative oxidation of the CO to CO sub 2 . The CO sub 2 is collected on Ascarite and weighed. This method was tested using a tungsten carbide reference material (NBS-SRM-276) and a (U,Pu)C sample. For 42 analyses of the tungsten carbide, which has a certified carbon content of 6.09%, an average value of 6.09% was obtained with a standard deviation of 0.01 sub 7 % or a relative standard deviation of 0.28%. For 17 analyses of the (U,Pu)C sample, an average carbon content of 4.97% was found with a standard deviation of 0.01 sub 2 % or a relative standard deviation of 0.24%. (ERA citation 05:013948)

LA-8062 PC **A03**/MF **A01**
Los Alamos Scientific Lab., NM.
Theoretical Equations of State for the Rare Gases.
G. I. Kerley, and P. M. Henry. Jan 80, 41p
Contract W-7405-ENG-36

Theoretical equations of state and related calculations are reported for the rare gases neon, argon, krypton, and xenon. The liquid and vapor phases were computed using a model which is based upon thermodynamic perturbation theory. The fluid model requires an expression for the potential energy of a molecule in the force field of its neighbors; this function is derived from the zero-temperature isotherm of the solid. The solid isotherm was determined from static-compression data and statistical atom theory. The solid data were the only experimental information used to construct the liquid model. Comparisons are made with measured isothermal-compression data, sound speeds, vaporization curves, Hugoniots, structure factors, viscosities, and melting curves. Agreement with experiment is good. (ERA citation 05:014458)

LA-8192-MS PC **A05**/MF **A01**
Los Alamos Scientific Lab., NM.
Nuclear Techniques for the Chemical Analysis of Environmental Materials.
E. S. Gladney, D. B. Curtis, D. R. Perrin, J. W. Owens, and W. E. Goode. Jan 80, 95p
Contract W-7405-ENG-36

The specific nuclear methods used by the Environmental Surveillance Group for elemental analysis of water, geological, and biological samples are described in detail. Reactor facilities, thermal and epithermal neutron activation, capture gamma -ray spectrometry, and delayed neutron assay are covered. Detailed tabulations of gamma -ray emitting species by both isotope and energy are included. (ERA citation 05:013933)

LBL-10138 PC **A08**/MF **A01**
California Univ., Berkeley. Lawrence Berkeley Lab.
Crossed Beam Studies of Full and Half Collisions.
R. K. Sparks. Nov 79, 173p
Contract W-7405-ENG-48
Thesis.

Results of two experiments performed on a new very high resolution crossed molecular beams apparatus are discussed. The first experiment, photofragmentation of methyl iodide, is deconvoluted to yield vibrational state distributions for the recoiling methyl fragment. These distributions are then analyzed in terms of half-collision models and Franck-Condon factors. The second experiment, a full-collision example, is the reaction of F atoms with H sub 2 and D sub 2 . Laboratory angular and velocity distributions for both systems are obtained at several energies. Center-of-mass product distributions are calculated and discussed in terms of recently predicted state dependent resonance phenomena for the reaction. The design of the new apparatus is also discussed. (ERA citation 05:013930)

LBL-8011 PC **A14**/MF **A01**
California Univ., Berkeley. Lawrence Berkeley Lab.
Thermodynamics of Solid and Liquid Group III-V Alloys.
T. J. Anderson. Oct 78, 302p
Contract W-7405-ENG-48
Thesis.

Solid-state electrochemical techniques are applied to the Ga-In-Sb-O system to measure some thermodynamic properties important for the analysis of solid-liquid phase equilibria in these important semiconductor materials. The standard Gibbs energies of formation of the most stable oxides of gallium and of indium are determined with a high-temperature solid-state electrochemical cell utilizing calcia-stabilized zirconia as the solid electrolyte and a (CO + CO sub 2) gaseous mixture as the reference electrode. (ERA citation 05:013906)

LBL-8413 PC **A04**/MF **A01**
California Univ., Berkeley. Lawrence Berkeley Lab.
Image Processing of Small Protein-Crystals in Electron Microscopy.
D. A. Feinberg. Nov 78, 71p
Contract W-7405-ENG-48

This electron microscope study was undertaken to determine whether high resolution reconstructed images could be obtained from statistically noisy micrographs by the super-position of several small areas of images of well-ordered crystals of biological macromolecules. Methods of rotational and translational alignment which use Fourier space data were demonstrated to be superior to methods which use Real space image data. After alignment, the addition of the diffraction patterns of four small areas did not produce higher resolution because of unexpected image distortion effects. A method was developed to determine the location of the distortion origin and the coefficients of spiral distortion and pincushion/barrel distortion in order to make future correction of distortions in electron microscope images of large area crystals. (ERA citation 05:014453)

LBL-9796 PC **A07**/MF **A01**
California Univ., Berkeley. Lawrence Berkeley Lab.
Multiphoton Processes in Isolated Atoms and Molecules.
A. S. Sudbo. Nov 79, 132p
Contract W-7405-ENG-48
Thesis.

The theory of coherent excitation of a multilevel quantum mechanical system is developed. Damping of the system is taken into account by the use of a density matrix formalism. General properties of the wave function and/or the density matrix are discussed. The physical implications for the behavior of the system are described, together with possible applications of the formalism, including the infrared multiphoton excitation of molecules, and optical pumping in alkali atoms. Experimental results are presented on the infrared multiphoton dissociation of molecules, followed by a discussion of the general features of this process. The experimental results were obtained using a crossed laser and molecular beam method, and the emphasis is on determining the properties of the dissociating molecule and the dissociation products. The dissociation process is shown to be described very well by the standard statistical theory (RRKM theory) of unimolecular reactions, a brief presentation of which is also included. (ERA citation 05:012716)

LBL-9819 PC **A07**/MF **A01**
California Univ., Berkeley. Lawrence Berkeley Lab.
Quenching of Metastable Rare Gases by Calcium Atoms and Metal Carbonyls.
D. C. Hartman. Oct 79, 147p
Contract W-7405-ENG-48
Thesis.

A flowing afterglow chemiluminescence apparatus was used to study three important processes, associative ionization, Penning ionization, and collisional dissociation. The metastable rare gases Ar, Ne and He were used as energy donors. (ERA citation 05:010732)

LBL-9885 PC **A07**/MF **A01**
California Univ., Berkeley. Lawrence Berkeley Lab.
Tensi-Volumetric Studies of the CaCO sub 3 - CaO-CO sub 2 System.
R. K. Shukla. Dec 79, 149p
Contract W-7405-ENG-48
Thesis.

A tensi-volumetric apparatus was developed and used to study two aspects of the CaO-CO sub 2 - CaCO sub 3 system, namely the thermodynamics of the CaCO sub 3 (calcite) phase viewed as a pseudo-binary solid solution of CaO and CO sub 2 , and the kinetics of decomposition of CaCO sub 3 (calcite). The solubility of CO sub 2 in the calcite (CaCO sub 3) phase was studied as a function of pressure and temperature. It is shown that it is possible to obtain calcite of substoichiometric compositions expressed by (CaO x (CO sub 2)/sub 1-delta), where at the temperatures of measurement, 773 exp 0 K to 1000 exp 0 K, delta is a small, but measurable quantity. The composition limits of this phase increase rapidly with temperature. Calcite decomposition rates were measured in the range of P//sub Peq/ from 0.05 to about 0.8 and in the temperature range of 853 exp 0 to 933 exp 0 K. The decomposition rate changed by about three orders of magnitude in this range of P//sub Peq/ at every temperature of study. Decomposition rates of calcite powder depend on particle size, powder bed depth and compactness of samples. Measurements with single crystals of calcite suggest that at least two different processes limit the decomposition rate in different P//sub Peq/ regimes. The apparent activation enthalpy, delta H/ sup */, for decomposition at P//sub Peq/ less than or equal to 0.1, calculated in terms of decomposition fluxes, is about 49.2 +- 1.2 K cals mole exp -1 . At values of P//sub Peq/ near unity, the value of delta H/sup */ rose to about 61.8 +- 1.8 K cals mole exp -1 . Decomposition rates for powders did not show a consistent apparent activation enthalpy over the range of P//sub Peq/ studied; they varied between 65 and 80 K cals mole exp -1. (ERA citation 05:013981)

LBL-9992 PC **A02**/MF **A01**
California Univ., Berkeley. Lawrence Berkeley Lab.

Negative-Hydrogen-Ion Production by Backscattering from Alkali-Metal Targets.
P. J. Schneider, K. H. Berkner, W. G. Graham, R. V. Pyle, and J. W. Stearns. Nov 79, 12p CONF-791057-2
Contract W-7405-ENG-48
Workshop on hydrogen recycling, Livermore, CA, USA, 17 Oct 1979.

Measurements have been made of the total backscattered D exp - and H exp - yields from Cs, Rb, K, Na and Li surfaces bombarded with D sub 2+ , D sub 3+ , H sub 2+ and H sub 3+ in the energy range 0.15 to 4 keV/nucleus. All measurements were made at a background pressure less than 10 exp -9 Torr and the alkali-metal surfaces were evaporated onto a substrate in situ to minimize contamination of surfaces. For each target, the D exp - and H exp - yields exhibited maxima (as high as 8% per incident deuteron or proton for Cs); the maxima occurred at incident energies between 300 and 1000 eV/nucleus and always occurred at a lower incident energy for H than for D for a given target. Both the H exp - and D exp - yields decreased, at any measured energy, in going from Cs to Li in the order given above. Measurements of the H exp - yield were also made for H sub 3+ bombarding a W substrate, as a function of the work function of the target, as Li was deposited on the W. The work function of the target showed a minimum as the Li coverage was increased and the H exp - yield showed a corresponding maximum which was almost two orders of magnitude higher than the H exp - yield for a thick Li target. (ERA citation 05:012710)

N80-20584/2 PC **A04**/MF **A01**
Max-Planck-Inst. fuer Stroemungsforschung, Goettingen (Germany, F.R.).
A Study of the Collision Processes in the Thermic Energy Region by Using Atoms Excited by Laser Light Untersuchungen von Stossprozessen MIT Laserangeregten Atomen in Thermischen Energiebereich.
H. Tischer. Aug 78, 68p MPIS-2/1978, ISSN-0436-1199
Text in German.

An argon laser was used to investigate the conditions of excitation of Na atoms. Problems encountered with laser stability and in obtaining the desired energy density in the shock region are discussed. Measurements of the transverse dispersion which varied with the polarization of the laser beams are presented.

N80-21123/8 PC **A07**/MF **A01**
Max-Planck-Inst. fuer Stroemungsforschung, Goettingen (Germany, F.R.).
Study of the Interactions of Rare Gas Molecules by Measuring Total and Differential Transverse Scattering Untersuchung von Edelgas-Molekuel-Wechselwirkungen durch Messung Totaler und Rotationsaufgeloester Differentieller Streuquerschnitte.
Ph.D. Thesis - Goettingen Univ., West Germany.
J. Schleusener. Aug 78, 149p MPIS-15/1978, ISSN-0436-1199
Text in German.

A universal instrument for measuring transverse dispersions was built. A precise determination was made of the energy potentials from the diffraction oscillations for He-Ne and D2-Ne, and for a superposition of rapid oscillations for Ar-Kr and Ar-CH4. For the system ND-Ne, the differential transversal rotative effect was measured in the case of the interaction of neutral particles.

N80-21124/6 PC **A07**/MF **A01**
Max-Planck-Inst. fuer Stroemungsforschung, Goettingen (Germany, F.R.).
Measures of the Transverse Differential Effect for the Rotary Excitation of the Molecule HD Colliding with Ne and D2 Messung Differentieller Wirkungsquerschnitte fuer die Rotationsanregung von HD-Molekuelen Im Stoss MIT Ne und D2.
Ph.D. Thesis - Goettingen Univ., West Germany.
F. Huisken. Aug 78, 127p MPIS-16/1978, ISSN-0436-1199
Text in German.

The systems HD-Ne and HD-D2 were examined by a method of pseudostatistical analysis for the case of inelastic collisions. The range of transverse dispersions was studied for different levels of shock energy in relation with the molecular rotation and scattering angle. A comparison was made between elastic and inelastic systems. For the system HD-Ne, measurements of the inelastic transverse dispersion differential show correct values for the anisotropic potentials.

N80-21125/3 PC **A04**/MF **A01**
Max-Planck-Inst. fuer Stroemungsforschung, Goettingen (Germany, F.R.).
Direct Observation of the Reactions of the Atom O(1D) with Halogen Compounds of Methane and with Methane and Water Direkte Untersuchung der Reaktion von O(1D)-Atomen MIT Halogenierten Methanen, Methan und Wasser.
K. Kaufmann. Nov 78, 58p MPIS-25/1978
Text in German.

Excited atoms of oxygen O(1D) produced by photolysis of ozone can react with halogen compounds of methane (namely the freons) in the upper atmosphere. An instrument was constructed to simulate the conditions of the reaction and analyze the reaction products. Results for the freons, CF3Br, CH4, and H2O are presented which show the distributions among the different possible reactions.

N80-21126/1 PC **A07**/MF **A01**
Max-Planck-Inst. fuer Stroemungsforschung, Goettingen (Germany, F.R.).
A Study by Optical Spectroscopy of Chemiluminescent Reactions Between Ions and Molecules for N(+)+NO Yields N2(+)* +O Untersuchung Chemilumineszenter Ionen-Molekuel-Reaktionen.
Ph.D. Thesis - Goettingen Univ.
D. Brandt. Mar 79, 134p MPIS-4/1979
Text in German. Sponsored in Part by Deut. Forschungsgemeinschaft (Dfg).

A spectrometer, adapted to determine the excitation level after a reaction between monatomic ions and diatomic molecules, is described. The photons emitted during the interaction of the ion beam and the gas were counted. UV emissions were observed in the spectral bands between 3,000 and 4,400 A during the interaction between ions N(+) and the gas NO at shock energy levels between 1 and 20 eV. A hypothesis concerning shock energy was used to compare the measurements and results of the simulation.

N80-21181/6 PC **A08**/MF **A01**
Max-Planck-Inst. fuer Stroemungsforschung, Goettingen (Germany, F.R.). Abt. Atom- und Molkuel physik.
Measurements and Calculations of Electronic Excitation from Collisions Between Atoms of Alkalis and Mercury in the Energy Range 10 Ev to 1400 Ev Messung und Berechung Integraler Elektronischer Anregungsquerschnitte fuer Alkali-Quecksilber-Stosssysteme Im Energiebereich Zwischen 10 und 1400 Ev.
G. Moritz. Nov 78, 151p MPIS-24/1978
Text in German.

Exchanges between the alkali metals Na, K, Cs, Rb, and Hg were studied by measuring the radiation emitted in a dispersion chamber when the alkali beam interacts with the mercury atoms. Spectrum analysis and intensity measurements show that the dominant factor is the scattering of the lowest resonance level of the alkali. Application of quantum mechanics (with the solution of the Schroedinger equations) gave exact solutions in the low energy domain.

ORNL-5623 PC **A03**/MF **A01**
Oak Ridge National Lab., TN.
Solubility of Gibbsite (Alpha - A1(OH) Sub 3) in 1 Molal NaCl as a Function of pH and Temperature.
B. F. Hitch, R. E. Mesmer, C. F. Baes, Jr., and F. H. Sweeton. Jan 80, 35p
Contract W-7405-ENG-26

Discussed are the advantages and disadvantages of the column approach to study the pH dependence of the solubility of well crystallized hydroxides, and preliminary results on gibbsite (Al(OH) sub 3) are presented. Good results have been obtained in the basic region, and the temperature dependence of the equilibrium quotient for the reaction Al(OH) sub 3 (c) + OH exp - reversible Al(OH) sub 4- in IM NaCl is given by log Q/sub s14//sup b/ = 3.3766 - 1326.4/T with an agreement factor of 0.035 (unit weights). These measurements were made over the temperature range 35 to 90 exp 0 C at the base concentrations of 0.01 M and 0.1 M NaOH. The principal difficulty with the column approach is the strong buffering capacity of the column itself for equilibrations in the near neutral pH region. We found that the capacity could be accounted for in terms of monolayer adsorption (or reaction) of H exp + ions. Although insufficient evidence for equilibrium was obtained, data in the pH range 3 to 4 give the value of -7.20 +- 0.15 at 60 exp 0 C for the log Q/sub s10/ for the reaction Al(OH) sub 3 (c) + 3H exp + reversible Al exp 3+ + H sub 2 O. Results of solubility measurements in the near neutral region are preliminary. 8 figures, 4 tables. (ERA citation 05:013982)

ORO-4447-101 PC **A03**/MF **A01**
Tennessee Univ., Knoxville. Dept. of Chemistry.
Physical-Chemical Studies of Transuranium Elements. Progress Report, April 1, 1979-March 31, 1980.
J. R. Peterson. 1980, 26p
Contract EY-76-S-05-4447

Major advances in our continuing program to determine, interpret, and correlate the basic chemical and physical properties of the transuranium elements are summarized for the period April 1, 1979 through March 31, 1980. The enthalpy of solution of metallic Am-243 was measured in 1.0 N HC1 at 298 K and found to be -621.1 +- 1.6 kJ/mol. The first calorimetric measurements on element 98 were performed by dissolving metallic Cf-249 in dilute HC1. Spectroelectrochemical techniques were applied to a study of the Ce(IV)/Ce(III), Pr(IV)/Pr(III), Tb(IV)/Tb(III), Am(IV)/Am(III), and Cm(IV)/CM(III) couples in aqueous carbonate solution. Pr(IV) and Tb(IV), previously unknown in common aqueous solution, were stabilized in pH-adjusted 5.5 M K sub 2 CO sub 3 solution. Am(III) was oxidized to Am(IV) and then to Am(V), and solution absorption spectra were obtained. Attempts to oxidize Cm(III) in 5.5 M K sub 2 CO sub 3 solution were unsuccessful. Anion effects on the sorption of trivalent Am-241 and pentavalent Np-235 on various minerals were investigated. Formation of actinide ion complexes in solution with HPO sub 42- , HCO sub 3- , SO sub 42- , OH exp - , and F exp - ions increased the sorption of the actinides on the geologic media studied. The particularly enhanced sorption of these actinides onto apatite suggests its use as a component in the backfill material surrounding the nuclear waste containers in a repository. (ERA citation 05:012265)

PATENT-4 192 910 Not available NTIS
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, OH.
Catalyst Surfaces for the Chromous/Chromic Redox Couple.
Patent,
J. D. Giner, and K. J. Cahill. Filed 29 Nov 78, patented 11 Mar 80, 8p N80-20487/8, PAT-APPL-964 754 NASA-CASE-LEW-13148-1
Supersedes PAT-APPL-964 754-78, N79-14538 (17 - 05, p 0618). Sponsored by NASA.
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC. 20231 $0.50.

An electricity producing cell of the reduction-oxidation (REDOX) type is described. The cell is divided into two compartments by a membrane, each compartment containing a solid inert electrode. A ferrous/ferric couple in a chloride solution serves as a cathode fluid which is circulated through one of the compartments to produce a positive electric potential disposed therein. A chromic/chromous couple in a chloride solution serves as an anode fluid which is circulated through the second compartment to produce a negative potential on an electrode disposed therein. The electrode is an electrically conductive, inert material plated with copper, silver or gold. A thin layer of lead plates onto the copper, silver or gold layer when the cell is being charged, the lead ions being available from lead chloride which was added to the anode fluid. If the REDOX cell is then discharged, the cur-

rent flows between the electrodes causing the lead to deplate from the negative electrode and the metal coating on the electrode will act as a catalyst to cause increased current density.

PATENT-4 194 115 Not available NTIS
National Aeronautics and Space Administration. Pasadena Office, CA.
Method and Means for Helium/Hydrogen Ratio Measurement by alpha Scattering.
Patent,
A. B. Whitehead, and T. A. Tombrello. Filed 7 Nov 78, patented 18 Mar 80, 8p N80-20334/2, PAT-APPL-958 573
Supersedes PAT-APPL-958 573-78, N79-12416 (17 - 03, p 0329). Sponsored by NASA.
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC. 20231 $0.50.

An apparatus for determining helium to hydrogen ratios in a gaseous sample is presented. The sample is bombarded with alpha particles created by a self contained radioactive source and scattering products falling within a predetermined forward scattering angular range impact a detector assembly. Two detectors are mounted in tandem, the first completely blocking the second with respect to incident scattering products. Alpha particle/hydrogen or alpha particle/helium collisions are identified by whether scattering product impacts occur simultaneously in both detectors or only in the first detector. Relative magnitudes of the two pulses can be used to further discriminate against other effects such as noise and cosmic ray events.

PB80-163678 PC **A02**/MF **A01**
Environmental Research Lab., Gulf Breeze, FL.
Determination of Pentachlorophenol in Marine Biota and Sea Water by Gas-Liquid Chromatography and High-Pressure Liquid Chromatography.
Journal article,
Linda F. Faas, and James C. Moore. Jun 79, 5p EPA-600/J-79-053
Pub. in Journal of Agricultural and Food Chemistry, v27, n3, p554-557, Jun 79.

A method is described for measuring pentachlorophenol (PCP) in samples from the estuarine environment. Gas-liquid chromatography (GLC) is used to determine PCP residues in tissues as low as 0.01 ppm by formation of the ethyl diazohydrocarbon derivative, followed by Florisil cleanup. Application of the method to exposed organisms indicates that PCP accumulates in mullet (Mugil cephalus), grass shrimp (Palaemonetes pugio), and eastern oysters (Crassostrea virginica). Sea water concentrations as low as 0.002 ppb may be detected by formation of the amyl diazohydrocarbon derivative. Formation of the amyl derivatives of PCP and several related compounds gives GLC separation not possible with the methyl or ethyl derivatives. Parameters are outlined for high-pressure liquid chromatography (LC) determination of the free phenol without cleanup. Ultraviolet detection limits for PCP by LC are 5.0 ppm in tissues and 2.0 ppb in seawater.

PB80-165707 Not available NTIS
National Bureau of Standards, Washington, DC.
Thorium Field Ion Microscopy.
Final rept.,
J. J. Carroll, R. Klein, and A. J. Melmed. 1980, 5p
Sponsored in part by Office of Naval Research, Washington, DC.
Pub. in Journal Surf Science Letter 93, pL93-L97 1980.

A method of preparing and imaging thorium specimens for field ion microscopy is presented. Micrographs indicate that impurity constituents of the 99.9% material are readily imaged. Application of the electrotransport purification technique significantly reduces the concentration of imaged impurity constituents. Field electron emission micrographs obtained from previously field evaporated surfaces at 30K demonstrate feasibility of field emission studies involving surface adsorption and migration.

PB80-165715 Not available NTIS
National Bureau of Standards, Washington, DC.
Time-Dependent Spectrum of Resonance Fluorescence.
Final rept.,
J. H. Eberly, C. V. Kunasz, and K. Wodkiewicz. 1980, 23p
Grant NSF-PHY76-04761
Pub. in Journal of Physics B: Atomic Molecular Physics 13, p217-239 1980.

Time-dependent features of the resonance fluorescence spectrum are studied. Attention is focused on the dynamic evolution of the emission spectrum following abrupt excitation of a near-resonant two-level absorber by a strong laser field. The multiphoton character of the absorption-emission process is evident in the AC Stark splitting of the spectrum, which begins approximately half an atomic lifetime after excitation, if the laser field is strong enough.

PB80-165764 Not available NTIS
National Bureau of Standards, Washington, DC.
Accuracy of Realizing Thermodynamic Temperatures by Gas Thermometry.
Final rept.,
L. A. Guildner. 1980, 7p
Pub. in PTB Mitteilungen. Amts- und Mitteilungsblatt der Physikalisch-Technischen Bundesanstalt 90, n1/80, p41-47 1980.

The status of gas thermometry as a means of accurately realizing thermodynamic temperatures is considered in terms of the NBS gas thermometer. Following a discussion of the accuracies attained over the present temperature range, an appraisal of the optimum conditions for operating the gas thermometer up to the gold point and of the resulting uncertainties is given.

PB80-165798 Not available NTIS
National Bureau of Standards, Washington, DC.
Use of Solid-State 13 CNMR in Structural Studies of Humic Acids and Humin from Holocene Sediments.
Final rept.,
P. G. Hatcher, D. L. VanderHart, and W. L. Earl. 1980, 6p
Pub. in Journal of Organic Geochemistry 2, p87-92 1980.

(13)CNMR spectra of solid humic substances in Holocene sediments have been obtained using cross polarization with magic-angle sample spinning technique. The results demonstrate that this technique holds great promise for structural characterizations of complex macromolecular substances such as humin and humic acids. Quantifiable distinctions can be made between structural features of aquatic and terrestrial humic substances. The aliphatic carbons of the humic substances are dominant components suggestive of input from lipid-like materials. An interesting resemblance is also noted between terrestrial humic acid and humin spectra.

PB80-166150 PC **A05**/MF **A01**
Los Alamos Scientific Lab., NM.
Trace Element Characterization of Coal Wastes. Third Annual Progress Report, October 1, 1977-September 30, 1978,
E. M. Wewerka, J. M. Williams, L. E. Wangen, J. P. Bertino, and P. L. Wanek. Jun 79, 94p LA-7831-PR, EPA-600/7-79-144
See also Annual rept. no. 1 dated Mar 78, LA-6835-PR. Sponsored in part by Department of Energy, Washington, DC.

The report gives third year results of a program to characterize the trace element content of coal waste. In 1978 laboratory experiments were performed to investigate the efficacy of several control options to treat coal wastes at the preparation plant or during disposal. The research revealed that calcining is one of the more effective and permanent means of treating high sulfur coal wastes before disposal to decrease, quite dramatically, the release of environmentally undesirable pollutants into the drainages from disposal sites. Co-disposal of the coal wastes with lime or limestone to neutralize the acid drainage and contain soluble aqueous contaminants within the waste site is also a promising control. Other experiments examined the feasibility of using natural sealants (e.g., clays, soils, calcite, and cements) to isolate the disposal site from its immediate environment. The report discusses the various trade offs for these control options in terms of contaminant reduction, complexity, permanency, and cost.

PB80-166457 PC **A03**/MF **A01**
Idaho Univ., Moscow. Water Resources Research Inst.
Ion Exchange Recovery of Cobalt and Copper from Blackbird Mine Drainage.
Technical completion rept.,
K. A. Prisbrey, J. F. Williams, and H. Lee. Jan 80, 30p W80-04296, OWRT-A-067-IDA(1)
Presented at the Annual AIME Meeting (109th), Las Vegas, NV, February 24-28, 1980.

Approximately 300 ppm copper and 50 ppm cobalt flow in a 400 gallon per minute acid mine drainage stream named Bucktail Creek from the Blackbird Mine near Cobalt, Idaho in the Salmon National Forest. Bucktail Creek is part of the Panther Creek drainage. Salmon, Steelhead and other aquatic life are destroyed up to twenty miles downstream from the heavy metal contamination. Ion exchange resin beads reduce contaminants to less than 0.1 ppm cobalt and copper. Equilibrium and kinetic data are extracted from laboratory tests for cobalt and copper loading. Field tests using fluidized ion exchange demonstrate the feasibility of this strategy to reduce contaminants. The advantages of the fluidized systems are discussed and compared to other alternatives.

PB80-166911 PC **A04**/MF **A01**
Georgia Univ., Athens. Dept. of Chemistry.
New Liquid Chromatographic Detection System for Environmental Pollutants.
Final rept. Jan 76-Dec 78,
L. A. Carreira, and L. B. Rogers. Feb 80, 74p EPA-600/4-80-015
Grant EPA-R-804155-03-0

Resonance enhanced coherent anti-Stokes Raman spectrometry (CARS) has been demonstrated as a specific identification system for liquid chromatography for water pollution identification. To achieve this, liquid chromatographic preconcentration and separation and computer control of the liquid chromatograph/ultraviolet-visible/CARS were undertaken. Observations useful in relating experimental variables in the preconcentration step to the recovery of a given species were made. A system consisting of a liquid chromatograph, a scanning ultraviolet-visible spectrometer and the CARS was automated using a minicomputer. Column selection, flow rate, and solvent composition were monitored and controlled. The ultraviolet-visible spectrometer was used at a fixed wavelength until a species was detected. The Raman spectra were then scanned under control of the computer with on-line signal averaging and data smoothing.

PB80-167018 PC **A03**/MF **A01**
Rockwell International, Thousand Oaks, CA. Science Center.
Mechanism of SO2 and H2SO4 Aerosol Zinc Corrosion.
Final rept. 9 May-9 Jun 79,
Alan B. Harker, Florian B. Mansfeld, Dennis R. Strauss, and Dwight D. Landis. Jan 80, 42p EPA-600/3-80-018
Contract EPA-68-02-2944

This study established the physical variables controlling the SO2 and H2SO4 induced corrosion of zinc. Relative humidity, temperature, air flow velocity, flow turbulence, aerosol size range, and pollutant concentration were controlled. Corrosion measurements were made through the use of an atmospheric corrosion monitor. The results showed that the principal factors controlling pollutant induced corrosion are relative humidity, the rate of pollutant flux to the surface, and the chemical form of the pollutant. SO2 was observed to induce a higher corrosion rate in the zinc than H2SO4 on a molecule for molecule basis. Flow dynamic measurements provided bulk and size detailed deposition velocities for two different accumulation mode H2SO4 aerosol size distributions as a function of frictional velocity, and a deposition velocity for SO2 gas. The overall results indicate that under most ambient conditions SO2 induced corrosion damage will dominate over H2SO4 effects.

PB80-168875 PC A10/MF A01
North Dakota State Dept. of Health, Bismarck. Div. of Environmental Research.
The Long-Term Effects of Trace Elements Emitted by Energy Conversion of Lignite Coal. Volume II. Technical Appendices.
Final rept.,
William W. Morrison, Martin R. Schock, and Gene A. Christianson. Jul 79, 211p
Contract OWRC-10773210
See also Volume 1, PB80-168867.

A two-year project, concerning effects of selected elements upon the ecosystem surrounding a 675-megawatt coal-fired electrical generating facility, was completed. This project involved the collection of coal, stack fly ash, aerosol, surface water, snow, sediments, soil, and vegetation samples for analysis of element concentrations. A modified atmospheric transport and deposition computer model was developed and used to predict ground-level air concentrations and development of elements from the burning of lignite coal. The results of the project provide evidence of enrichment of certain elements in aerosols, snow, water, soil surface, and vegetation.

PB80-169238 PC A03/MF A01
Little (Arthur D.), Inc., Cambridge, MA.
Preparation of Standards for Valence State Measurement by X-Ray Fluorescence.
Final rept.,
Edward T. Peters, and Kenneth T. Menzies. Jan 80, 43p EPA-600/2-80-025
Contract EPA-68-02-2750

The preparation and characterization of standard samples representing several valence states for sulfur, vanadium, and chromium are described. The standards will be used by the U.S. Environmental Protection Agency to investigate the potential for determining valence state by high resolution wavelength dispersive x-ray emission analysis. A total of 40 single state and 13 multistate standards were prepared by dust generation and collection on polycarbonate filters. The prepared samples and valence states include sulfur (0, +4, +6, -2), vanadium (0, +4, +5), and chromium (+3, +6). At least three standards were prepared for each valence state, with mass concentration of the valence state element in the range 1 to 50 micrograms/sq cm. The prepared samples were coated with a thin layer of nitrocellulose by a wicking procedure to provide a protective coating and to prevent loss of material. Representative samples were analyzed for the uniformity of the deposit, mean particle size and stability in air, and x-ray irradiation.

PB80-169352 PC A05/MF A01
National Bureau of Standards, Washington, DC. National Measurement Lab.
The Development of an Aqueous Trace Organic Standard Reference Material for Energy Related Applications: Investigation of the Aqueous Solubility Behavior of Polycyclic Aromatic Hydrocarbons.
Interim rept. Nov 76-May 78,
Willie E. May. Feb 80, 90p EPA/600/7-80-031

The development of a Standard Reference Material for aqueous solutions of known concentration of polynuclear aromatic hydrocarbons is an extremely difficult procedure. This paper is one of a series discussing the development of a generator column technique at NBS for the production of Standard Reference Materials for PAH's in water. In addition to providing the basis for SRM development the aqueous solubility is a fundamental parameter in assessing the extent and rate of the dissolution of energy based polynuclear aromatic hydrocarbons and their persistence in the aquatic environment.

PB80-169691 PC A07/MF A01
Rockwell International, Creve Coeur, MO. Environmental Monitoring and Services Center.
Regional Air Pollution Study: Gas Chromatography Laboratory Operation.
Final rept.,
G. Cardwell. Jan 80, 139p EPA-600/4-80-006
Contract EPA-68-02-2093
See also report dated Jul 76, PB-257 165.

A gas chromatography laboratory was set up to analyze air samples collected in Teflon bags and stainless steel tanks. Samples were analyzed for total hydrocarbons, methane, CO, and C2-C10 hydrocarbons. A total of 455 samples, including replicates, were analyzed during the summer and fall of 1976. Many samples were collected at 12 of the Regional Air Monitoring Systems (RAMS) sites to yield data on spatial and temporal distributions of hydrocarbons. Additional sampling was performed to study ethylene contamination in and around RAMS stations. Roadway samples were collected to determine the composition of freshly emitted vehicular pollution. Quality control audits indicated good system performance during the study. Replicate samples indicated good reproducibility for samples stored for as long as six days in the Teflon bags. All data, including sums of paraffins, olefins, aromatic, and total non-methane hydrocarbons are stored in the RAPS Data Bank at Research Triangle Park, North Carolina.

PB80-174360 PC A10/MF A01
Northrop Services, Inc., Research Triangle Park, NC.
APTI Course 450 Source Sampling for Particulate Pollutants: Student Manual,
G. J. Aldna, and J. A. Jahnke. Dec 79, 202p
EPA-450/2-79-006
Contract EPA-68-02-2374

This manual is used in conjunction with Course No. 450, 'Source Sampling for Particulate Pollutants', as designed and presented by the EPA Air Pollution Training Institute (APTI). The manual supplements the course lecture material, presenting detailed discussions in an introductory manner on the following topics: Basic Definitions for Source Sampling; Basic Concepts of Gases; The EPA Method 5 Sampling Train; The EPA Method 5 Source Test; Calibration Procedures; Source Sampling Calculations; Report Writing; Error Analysis; F-factor Methods; Particle Sizing; and Opacity Monitoring. Derivations are given for many of the basic source sampling equations. The manual, when used with the student workbook, EPA-450/2-79-007, during the lecture and laboratory sessions of Course No. 450, provides comprehensive instruction in the performance of EPA reference method 5.

PNL-SA-7086 PC A02/MF A01
Battelle Pacific Northwest Labs., Richland, WA.
Differential Cross Sections for Electron Emission in Heavy Ion-Atom Collisions.
L. H. Toburen. 1978, 7p CONF-781113-41
Contract EY-76-C-06-1830
Conference on application of small accelerators, Denton, TX, USA, 6 Nov 1978.

The systematics of differential ionization cross sections are explored for incident charged particles which possess atomic structure. Although little has been puolished regarding outer shell ionization by structured projectiles, sufficient data are becoming available to provide some insight into the collision process. This discussion concentrates on systematics of emission cross sections for the intermediate and high energy projectiles where the applicability of high energy approximations can be tested and the dramatic changes in emission spectra observed as the projectile energies decrease. Since heavy ion interactions are important in many research fields, it is particularly useful to determine where simple methods of cross section scaling may be appropriate. (ERA citation 05:012717)

PNL-3168 PC A04/MF A01
Battelle Pacific Northwest Labs., Richland, WA.
Evaluation of an in-Situ X-Ray Fluorescence Analyzer for Inorganic Pollutants in Sediments and Water Columns.
N. A. Wogman. Sep 79, 61p
Contract EY-76-C-06-1830

The applicability of an energy dispersive x-ray fluorescence spectrometer for measurement of trace elements in sediments and in water columns from Coast Guard vessels has been investigated. This investigation was conducted in both freshwater and saltwater areas and included Puget Sound, Lake Washington, Lake Union, and the ship canal in the State of Washington. The spectrometer system consisted of a solid cryogen-cooled Si(Li) detector and a exp 109 Cd excitation source. Sediments and water columns were viewed through a 0.2 mm Be window. This study showed the feasibility of measuring trace elements at concentrations ranging from 20 to about 100 ppM. Measurements of this sensitivity with a 100 mCi exp 109 Cd source are possible for time intervals as short as 5 minutes. This in-situ measurement capability permits the on-site mapping of pollution and avoids the problem of sediment disturbance which is inherent in the collection of grab samples of the sediment surface. Recommendations for an improved analyzer system included a detector assembly which could be towed, or allow continuous sediment surface analysis thereby recording the average composition of a large area. (ERA citation 05:012530)

RL-78-075 PC A03/MF A01
Science Research Council, Chilton (England). Rutherford Lab.
Chemical Interpretation of Magnetisstion Density Distributions.
J. B. Forsyth. 1978, 46p
U.S. Sales Only.

The subject is covered in sections: introduction; molecular orbital description of covalency (and its relation to magnetic neutron scattering); effect of covalency on the magnetization density distribution; single crystal neutron studies of bonding; determination of the ground state (examples of the application of neutron magnetic scattering to the determination of the ground states of actinide ions); some current studies in the field of the chemical interpretation of magnetization density distributions; conclusions. (Atomindex citation 09:415427)

SAND-79-1774C PC A03/MF A01
Sandia Labs., Albuquerque, NM.
Fundamental Processes in Ion Plating.
D. M. Mattox. 1980, 29p CONF-800205-2
Contract EY-76-C-04-0789
American Institute of Metallurgical Engineers meeting, Las Vegas, NV, USA, Feb 1980.

Ion plating is a generic term applied to film deposition processes in which the substrate surface and/or the depositing film is subjected to a flux of high energy particles sufficient to cause changes in the interfacial region of film properties compared to a nonbombarded deposition. Ion plating is being accepted as an alternative coating technique to sputter deposition, vacuum evaporation and electroplating. In order to intelligently choose between the various deposition techniques, the fundamental mechanisms, relating to ion plating, must be understood. This paper reviews the effects of low energy ion bombardment on surfaces, interface formation and film development as they apply to ion plating and the implementation and applications of the ion plating process. (ERA citation 05:012711)

UCRL-Trans-1587 PC A02/MF A01
Succinic Acid in Wines.
M. Castino. 1969, 22p
Contract W-7405-ENG-48
A, Vini d'Italia, 11 P509-521 1969.

Following a brief discussion of methods which are currently employed to determine the succinic acid content of wines, as well as the shortcomings of those methods, procedures used for colorimetric evaluation of this particular acid are explained. The principal advantages offered by the proposed method are: elimination of interference produced by 2-ketoglutaric acid (which produces succinic acid when permanganate oxidation occurs), notable simplification of procedures, and a need for only a small quantity of wine. Application of the proposed method with pure solutions and with wines of various origins confirms its validity in terms of satisfactory accuracy of data. With table wines and special types of wines (sparkling wines and wines having an aromatic content), succinic acid levels were found to vary between 0.50 and 1.18 grams per liter. (ERA citation 05:012221)

UCRL-15165 PC A03/MF A01
Brigham Young Univ., Provo, UT. Thermochemical Inst.
Calorimetric Studies of the TATB-Polymer-H sub 2 O System. Final Report.
D. J. Eatough, J. J. Christensen, and S. G. Collins. 31 Dec 79, 40p
Contract W-7405-ENG-48

Interaction of TATB with polymer increases in the order Phenoxy < Kel F < Kraton with respect to delta H values for the interaction in toluene, end point for addition of polymer to TATB, and hydration by water. Hydration of a mixture of TATB and polymer is different from hydration of either alone. This suggests formation of complexes containing water-TATB-polymer. (ERA citation 05:013988)

Y-2193 PC **A02**/MF **A01**
Oak Ridge Y-12 Plant, TN.
Determination of Nitrogen and Oxygen in Uranium Metal by Inert-Gas Fusion.
W. F. Carden. Dec 79, 19p
Contract W-7405-ENG-26

An improved analytical method has been developed using inert-gas fusion for determining the nitrogen and the oxygen contents of uranium metal. The analytical method is applicable to concentrations of nitrogen and oxygen ranging from 1 microgram per gram to 1000 micrograms per gram for each gas. In uranium metal, the limit of error for a single determination at the 95%-confidence level, at the 12-micrograms-per-gram-nitrogen level, is +-3 micrograms per gram nitrogen and, at the 20-micrograms-per-gram-oxygen level, is +-3 micrograms per gram oxygen. Nitrogen and oxygen concentrations are determined by using a nitrogen-oxygen determinator. (ERA citation 05:012217)

Y-2194 PC **A02**/MF **A01**
Oak Ridge Y-12 Plant, TN.
Determination of Hydrogen in Uranium-Niobium-Zirconium Alloy by Inert-Gas Fusion.
W. F. Carden. Dec 79, 18p
Contract W-7405-ENG-26

An improved method has been developed using inert-gas fusion for determining the hydrogen content in uranium-niobium-zirconium (U-7.5Nb-2.5Zr) alloy. The method is applicable to concentrations of hydrogen ranging from 1 to 250 micrograms per gram and may be adjusted for analysis of greater hydrogen concentrations. Hydrogen is determined using a hydrogen determinator. The limit of error for a single determination at the 95%-confidence level (at the 3.7- mu g/g-hydrogen level) is +-1.4 micrograms per gram hydrogen. (ERA citation 05:012218)

ZfK-355 PC **A02**/MF **A01**
Zentralinstitut fuer Kernforschung, Rossendorf bei Dresden (German D.R.).
Characterization of Structure of Flaws in Silicate Glass Surfaces by Ion-Exchange in Lithium Salt Melts.
A. Kolitsch, and E. Richter. Mar 78, 16p
In German.
U.S. Sales Only.

A method for characterization of flaws structure in silicate glass surfaces by ion-exchange in lithium salt melts is demonstrated. The possibilities and limits of the method are shown and several applications are discussed. (Atomindex citation 09:415467)

7E. Radio and Radiation Chemistry

JYFL-RR-6/79 PC **A02**/MF **A01**
Jyvaeskylae Univ. (Finland). Dept. of Physics.
Positron Trapping Rate into Vacancy Clusters.
R. M. Nieminen, and J. Laakkonen. May 79, 13p
U.S. Sales Only.

The trapping rate of positrons into vacancy clusters in metals has been calculated. It increases with the trap size and binding energy and approximately scales with the number of vacancies in small clusters. The phonon-mediated contribution to the trapping rate is small. The temperature dependence of the trapping process is discussed. (Atomindex citation 10:477926)

LBL-10052 PC **A05**/MF **A01**
California Univ., Berkeley. Lawrence Berkeley Lab.
Kaon Mass by Critical Absorption of Kaonic Atom X Rays.
G. K. Lum. Oct 79, 80p
Contract W-7405-ENG-48
Thesis.

The energy of the kaonic 6h implies 5g transition has been determined using the calculated mu /rho curve. Because the detectors used could not resolve the noncircular transitions, the predictions from a calculated cascade program were used. According to the cascade results for potassium, the number of noncircular x-rays was about 10% of all the transitions between n = 6 to n = 5. Based on the available information, the mass of the kaon was measured to be 493.576/sub -0.069//sup +0.044/ MeV. (ERA citation 05:009410)

ORO-5172-14 PC **A04**/MF **A01**
Maryland Univ., College Park.
Nuclear Chemistry Progress Report.
V. E. Viola, Jr. Aug 79, 70p
Contract EY-76-S-05-5172

Research activities during the period August 1, 1978 to July 31, 1979 are summarized. The major effort has continued to be devoted to the study of nucleon exchange and energy dissipation mechanisms in damped heavy-ion reactions. Among the most significant accomplishments of the program during the past year has been the measurement of damped fragment spectra with discrete Z and A resolution. These studies provided detailed information on the A/Z equilibration and nucleon exchange processes in damped heavy-ion collisions, gave evidence for structure in the partially damped energy spectra for the Fe + Fe reaction, showed the importance of target-projectile mass asymmetry in governing the evolution of damped reactions, and gave tentative evidence for several new isotopes in the Z = 22 to 26 range. Other experiments utilized the fission-fragment angular correlation technique to determine the linear momentum transfer from projectile to target for exp 16 O reactions in the 8- to 20-MeV/u region and to study simultaneously light-ion spectra (Z = 1 to 8) in coincidence with correlated events. These studies provided a much clearer picture of properties of central and peripheral collisions in heavy-ion reactions, as well as the transition between these two extremes. In addition, problems of Li, Be, and B nucleosynthesis and the relationship of these results to the question of the expanding universe were investigated. Individual sections with significant amounts of information are abstracted separately. (ERA citation 05:012261)

PAT-APPL-6-087 115 PC **A02**/MF **A01**
Department of the Army Washington DC
Laser Photochemical Synthesis and Coating of Optical Fiber.
Patent Application,
James A. Merritt. Filed 22 Oct 79, 4p AD-D007 111/8
Availability: This Government-owned invention available for U.S. licensing and, Possibly, for foreign licensing. Copy of application available NTIS.

Disclosed is a method to prepare and coat an optical fiber with Si3N4. The Si3N4 is synthesized from SiF4 + NH3 and/or SiH4 + NF3 by laser photochemical reaction (LPR) techniques in a controlled atmosphere chamber. The silicon fiber which is a representative optical fiber is drawn from a preform at about 2000 degrees C in a standard fiber drawing furnace. Immediately after drawing of fiber, the fiber is passed through a chamber with a controlled atmosphere containing SiX4 and NX3 gases, wherein X equals hydrogen or fluorine. A laser is used to irradiate the atmosphere and the Si3N4 is coated on the optical fiber to a thickness of about 0.02-0.20 micrometer which hermetically seals the fiber and enhances and maintains the mechanical strength thereof. (Author)

PER-38 PC **A02**/MF **A01**
Atomic Energy Board, Pelindaba, Pretoria (South Africa).
Radiation Polymerization of Tetrafluoroethylene in Freon-22.
N. G. Schnautz, and J. C. Thompson. Feb 79, 10p
U.S. Sales Only.

The radiation-induced solution-polymerization of tetrafluoroethylene in Freon-22 has been investigated over a temperature range of - 62 degrees celcius to 0 degrees celcius. The rate of polymerization for the in-source process was found to be directly propertional to monomer concentration and an activation energy of only 7,66 kj/mole was calculated. The number-average molecular mass of the product PTFE ranged from 2X10 exp 4 to 6X10 exp 4 and was relatively independent of the usual reaction parameters. The rate of postpolymerization was also found to be directly proportional to monomer concentration. The postpolyerization process did not result in any enchancement of the initial PTFE molecular mass. (Atomindex citation 10:463507)

8. EARTH SCIENCES AND OCEANOGRAPHY

8A. Biological Oceanography

PB80-166036 PC **A17**/MF **A01**
Texas A and M Research Foundation, College Station.
A Biological and Geological Reconnaissance of Selected Topographical Features on the Texas Continental Shelf.
Final rept.
Jan 76, 382p BLM/YM/ES-76/01
Contract DI-08550-CT5-4

During U.S. Department of Interior, Bureau of Land Management (BLM) public hearings held in 1973, 1974 and 1975 prior to Texas Outer Continental Shelf (OCS) oil and gas lease sales, concern was expressed over the possible environmental impact of oil and gas drilling and production operations on coral reefs and fishing banks in or adjacent to lease blocks to be sold. The report is an assessment of ground fish populations, reefal and epifaunal communities, meiofaunal and infaunal populations, unique biological and geological features, substratum type and distribution, and the biotic and geologic relationships between these banks and those farther north as a baseline study.

PB80-168107 Not available NTIS
Texas Univ. at Austin. Plant Ecology Research Lab.
Reproductive Physiology in the Seagrass, 'Syringodium filiforme', from the Gulf of Mexico and the Caribbean,
Calvin McMillan. 1980, 8p NSF/IDOE-80-8
Grants NSF-OCE74-24357, NSF-OCE76-84298
Sponsored in part by Grant NSF-OCE77-26399.
Pub. in American Jnl. of Botany, v67 n1 p104-110, 1980.

Reproductive physiology in Syringodium filiforme is controlled primarily by temperature under day length ranging from 12 hr to continuous light. Texas plants can be induced to flower at temperatures ranging from 20 to 24C, but southern Gulf of Mexico and Caribbean plants are most readily induced at 23-24C. Texas plants proceed to anthesis at temperatures above 22C, but St. Croix plants require higher temperatures, above 25C, for emergence of flowers from the bracts. Flowers induced under continuous light proceed to anthesis under day lengths shortened to 11 hr. but further floral induction is inhibited even under inductive temperatures. In natural seagrass beds, flowering occurs primarily under lengthening day lengths and warming temperatures that follow winter minima, but inflorescences may occur at other times of the year if temperatures permit.

PB80-168131 Not available NTIS
Texas Univ. at Austin. Plant Ecology Research Lab.
Differentiation in Habitat Response Among Populations of New World Seagrasses,
Calvin McMillan, and Ronald C. Phillips. c1979, 13p NSF/IDOE-80-7
Grants NSF-OCE76-84259, NSF-OCE77-25559
Prepared in cooperation with Seattle Pacific Coll., WA. Dept. of Biology.
Pub. in Journal of Aquatic Botany, v7, p185-196 1979.

Seagrass populations in diverse ecosystems show the selective influence of the local habitat conditions. The patterns of differentiation in the Gulf of Mexico and Caribbean seagrasses, Thalassia testudinum, Syringodium filiforme, and Halodule wrightii, and in the circumboreal seagrass Zostera marina, have been investigated by a variety of manipulative techniques in the laboratory and in the field. Although seagrasses may be vegetatively moved for long distances either by oceanic transport or by experimental procedures, their survival

patterns reflect the selective influence of their indigenous habitats.

PB80-169592 MF A01
National Oceanic and Atmospheric Administration, Seattle, WA. Environmental Research Labs.
Food Web Relationships of Northern Puget Sound and the Strait of Juan de Fuca. A Synthesis of the Available Knowledge.
Final rept. Mar 77-Dec 78,
Charles A. Simenstad, Bruce S. Miller, Carl F. Nyblade, Kathleen Thornburgh, and Lewis J. Bledsoe. Sep 79, 346p EPA-600/7-79-259
Available microfiche only because of poor quality. Prepared for MESA (Marine Ecosystems Analysis) Puget Sound Project, Seattle, WA.

This report resulted from the need to synthesize existing knowledge of the structure of food webs in nearshore marine habitats of northern Puget Sound and the Strait of Juan de Fuca, in order to identify the potential transfer processes of petroleum hydrocarbons through the marine ecosystem of the region. The objectives of this investigation were to: (1) identify the food web structures of biological communities of neritic, shallow sublittoral, and littoral habitats; (2) document seasonal, site, and regional variability in food web structure; (3) identify important predator-prey linkages that could be disrupted by a pollutant, and the potential consequences of disruption to the community; (4) identify the main prey organism groups utilized by economically or ecologically important predators; and (5) identify food chains having the greatest potential for transferring pollutants to higher trophic levels.

PB80-174162 PC A02
Woods Hole Oceanographic Institution, MA.
Steady-State Growth and Chemical Composition of the Marine Chlorophyte 'Dunaliella tertiolecta' in Nitrogen Limited Continuous Cultures,
Joel C. Goldman, and Dwight G. Peavey. Nov 79, 10p WHOI-CONTRIB-4368, NOAA-80031714
Grants NOAA-04-8-M01-149, NSF-OCE78-19420
Pub. in Applied and Environmental Microbiology, v38 n5 p894-901 Nov 79.

The marine chlorophyte Dunaliella tertiolecta was grown in continuous cultures under NH4+-N, NO2- -N, NO3- -N, and urea-N limitations. The effect of the nitrogen cell quota (Qn) on the steady-state growth rate (u) was the same regardless of the N source. The relationship between u and Qn was well described by the Droop equation, but only up to the true maximum growth rate u (= cell washout rate). The ratio between the minimum cell quota (kQ) and the maximum cell quota (Qm) was 0.19. Hence, there is no substitute for determining u experimentally. That there was no difference in growth response to different N sources suggests that no internal pooling of inorganic nitrogen occurred.

PB80-174584 PC A05/MF A01
State Univ. of New York at Stony Brook. Marine Sciences Research Center.
The Impact of Eelgrass on Heavy Metal Mobilization,
Wayne F. Penello, and Boudewijn H. Brinkhuis. May 79, 91p SR-23, REF-79-6, NOAA-80031213

Release of cadmium and manganese radionuclides from eelgrass leaves and root-rhizomes into seawater and seawater plus disodium ethylenediaminetetraacetate (EDTA) was monitored over periods of six hours following incubations of 1 to 98 hours. Flux of both isotopes from tissues is initially rapid, and enhanced by the addition of EDTA. Manganese apparently is released more slowly during latter phases of release, pointing to greater biological accumulation potential. Cadmium and manganese radionuclide uptake by Zostera marina L. tissues and translocation between root-rhizomes and leaves was examined. Cadmium concentrations in root-rhizomes increased with incubation time but appeared to reach saturation levels at 24 hr of exposure. Translocation of cadmium between root-rhizomes and leaves was observed to occur in both directions. A greater flux of cadmium downward was noted and root-rhizomes appear to be a cadmium sink.

PB80-174626 PC A02
Louisiana State Univ., Baton Rouge. Center for Wetlands Resources.
Phytoplankton Production in a Turbid, Temperate Salt Marsh Estuary,
R. E. Turner, S. W. Woo, and H. R. Jitts. c1979, 12p LSU-R-79-007, NOAA-80031208
Pub. in Estuarine and Coastal Marine Science, v9 p603-613 1979.

Maximum rates of particulate formation (Pmax) by phytoplankton in the Wassaw Sound estuary (Georgia, USA) average 20.2 mg C cu m/h. Annual primary production is about 90 g C/cum. The point at which plankton photosynthesis is saturated with light (I sub k) is lowest during winter. Short-term temperature fluctuations cause a shift in I sub k paralleling the seasonal relation of I sub k versus temperature. Seasonal changes in Pmax are also closely related to temperature in the estuary. Temporal and spatial variation of both Pmax and light attenuation is considerable. The marsh appears to be a net consumer of photosynthetically active phytoplankton cells. Estuarine flushing by storms and rivers spills the accumulated estuarine phytoplankton into the nearshore zone where the much more favorable light conditions leads to a dramatic increase in production per sq. m. (Copyright (c) 1979 Academic Press Inc.)

PB80-174683 PC A02
North Carolina Univ. at Chapel Hill.
The Response of Two Salt Marsh Molluscs, 'Littorina Irrorata' and 'Geukensia demissa', to Field Manipulations of Density and 'Spartina' Litter,
Alan E. Stiven, and Edward J. Kuenzler. c1980, 22p UNC-SG-R-143, NOAA-80032811
Pub. in Ecological Monographs, v49 n2 p151-171 Jun 79.

The significance of competition for space and food resources were investigated in three North Carolina salt marshes by altering densities of the molluscs Littorina irrorata and Geukensia demissa, and by manipulating Spartina litter. Mortality and weight gain were the two principal responses measured. The overall mortality and growth patterns of both species were similar within each marsh, but differed among marshes.

PB80-174717 PC A02
Gulf Coast Research Lab., Ocean Springs, MS.
A Filamentous Bacterium on the Brine Shrimp and Its Control,
Mobashir A. Solangi, Robin M. Overstreet, and Ann L. Gannam. 1979, 9p NOAA-80032801
Pub. in Gulf Research Reports, v6 n3 p275-281 1979.

A strain of a colorless, filamentous bacterium (tentatively identified as Leucothrix mucor) heavily infests the brine shrimp, Artemia salina. Its ultrastructure, unlike that of some other strains, does not reveal a distinct middle layer between its outer cell wall layer and cytoplasmic membrane, irregular blebs extending from the cell layers, or an external sheath. An entire infestation, represented as a mat of the bacterium with associated debris and microorganisms, sloughs from the shrimp when exposed to a variety of treatments. Primarily because most effective treatments are toxic to the shrimp, 100 ppm terramycin provides the treatment of choice.

PB80-174725 PC A03/MF A01
New Jersey Dept. of Environmental Protection, Trenton. Div. of Fish, Game, and Shellfisheries.
Inventory of Major Estuarine Systems.
Completion rept. Aug 74-May 79.
Feb 80, 45p NOAA-80032705

Recognizing the need for more background information on New Jersey's estuaries, the Division of Fish, Game and Shellfisheries launched in 1968 an Estuarine Inventory Program. Since the beginning of this program a total of six estuarine systems have been investigated along New Jersey's Atlantic coast. This report summarizes the work completed in three segments. Segment 1 was the continuation of a two-year study of the Manahawkin Bay-Little Egg Harbor System. Segment 2 was a study of Maurice River and Cove and Segment 3 was a study of the Back Bay Systems in Atlantic County. Basically 14 physical and chemical parameters were measured for physical-chemical studies. Fish, shellfish and sediment samples were also collected and analyzed for both pesticides (chlorinated hydrocarbons) and heavy metal (mercury, cadmium, lead, chromium and zinc) concentrations.

PB80-174733 PC A09/MF A01
Hawaii Inst. of Marine Biology, Honolulu.
Synopsis of Biological Data on the Green Turtle in the Hawaiian Islands,
George H. Balazs. Sep 79, 190p NOAA-80031102, NMFS/SWFC/AR-H-79-24C
Contract NOAA-79-ABA-02422

The green turtle, Chelonia mydas, constitutes most of the marine turtles in the Hawaiian Islands and has been the recipient of nearly all research conducted to date within this region of the Pacific. This synopsis brings together all of the biological information presently known on the population and, in doing so, focuses attention on future research needs.

PB80-174741 PC A02
Washington Univ., Seattle. Coll. of Fisheries.
Population Genetics of the Family Ostreidae. II: Interspecific Studies of the Genera 'Crassostrea and Saccostrea',
N. E. Buroker, W. K. Hershberger, and K. K. Chew. c1979, 15p WSG-TA-79-14, NOAA-80031003

The estimated levels of genetic variation are reported for 6 Crassostrea and 3 Saccostrea species. The estimates are based on examination of 25 to 34 genetic loci. The average heterozygosities ranged from 6 to 22% for the Crassostrea species and from 17 to 19% for the Saccostrea species. A new sibling species (S. manilai) from the Philippines has been identified by means of protein electrophoresis. The genetic similarity and distance between species has been computed for each genus. Also, a pair-wise comparison of loci and a dendrogram of the phylogenetic relationship of species has been constructed from the two genera. Some of the taxonomic levels during oyster speciation have been computed from the data of the electrophoretic study of the two lineages. The possibilities of oyster superspecies (e.g., C. gigas, C. virginica and S. cucullata) are discussed based on the population genetic study. (Copyright (c) by Springer-Verlag, 1979.)

PB80-174758 PC A02
Washington Univ., Seattle. Coll. of Fisheries.
Population Genetics of the Family Ostreidae. I: Intraspecific Studies of 'Crassostrea gigas' and 'Saccostrea commercialis',
N. E. Buroker, W. K. Hershberger, and K. K. Chew. c1979, 14p WSG-TA-79-13, NOAA-80031004
Prepard in cooperation with Maryland Univ., Crisfield, MD.

The levels of genetic variation and estimates of genetic similarity and distance were determined for populations of Crassostrea gigas (Thunberg) and Saccostrea commercialis (Iredale and Roughley). The proportion of polymorphic loci in Japanese populations of C. gigas ranged from 0.58 to 0.63, while the individual heterozygosities ranged from 0.20 to 0.22. The proportion of polymorphic loci in Australian populations of S. commercialis ranged from 0.43 to 0.46, the individual heterozygosities from 0.17 to 0.19. The genetic similarity between different geographic populations of both species was approximately 99%. The genetic distance and similarity data derived from this investigation has resulted in some provisional reclassifications. The Portuguese oyster C. angulata (Lamarck) appears to be more appropriately regarded as a recent colonized isolate of C. gigas. The New Zealand oyster S. glomerata (Gould) is considered a subspecies of the eastern Australian rock oyster S. commercialis. The Japanese Kumanoto population of C. gigas warrants reclassification as the non-sibling species C. sikamea. (Copyright (c) by Springer-Verlag, 1979.)

PB80-175144 PC A04/MF A01
Oregon State Univ., Newport. Marine Science Center.

Group 8A—Biological Oceanography

Workshop on Marine Mammal-Fisheries Interactions in the Northeastern Pacific Held at Seattle, Washington on 19-20 December 1977.
Final rept.,
Bruce R. Mate. May 80, 52p MMC-78/09
Contract MM8AC003

The workshop reviewed what is currently known of marine mammal/fisheries conflicts in Alaska, British Columbia, California, Hawaii, and Oregon (except sea otter and tuna/porpoise problems). Set gear types (such as longlines and gill nets) are more troubled by marine mammals (principally harbor seals and Steller or California sea lions) taking the catch and damaging gear and moving types of gear (such as trolled hooks or drag nets). There are increased conflicts with sport fisheries due to redistribution since the MMPA of 1972. The participants determined what data and methods were needed to make future management decisions and recommended that research be initiated on the conflicts of the Columbia River to develop these types of data.

PB80-175151 PC **A03**/MF **A01**
Washington Univ., Seattle. Fisheries Research Inst.
Methods for the Estimation of Krill Abundance in the Antarctic.
Final rept.,
Ole A. Mathisen. May 80, 35p MMC-77/21
Contract MM7AC032

In the energy budget of the Antarctic aquatic ecosystem, southern krill (Euphasia superba) occupy a central position. Because of their vast areal expansion and vertical distribution pattern, there can be no doubt that an assessment of krill must be based largely on hydroacoustic techniques. The present study should be seen as a contribution to the adaptation of hydroacoustic techniques to krill assessment. Field work was conducted from the South Georgia base of the British Antarctic Survey aboard its research vessel RR/V John Biscoe. Three specific objectives were identified: (a) to conduct acoustic experiments to assess the target strength of krill at different densities; (b) to determine diel changes in vertical distributions and the relationship between surface and deeper schools of krill; (c) if possible, to determine the size, configuration and density of krill swarms in and near Cumberland Bay.

PB80-176647 PC **A04**/MF **A01**
National Marine Fisheries Service, Seattle, WA.
Guide to Identification of Some Sculpin (Cottidae) Larvae from Marine and Brackish Waters off Oregon and Adjacent Areas in the Northeast Pacific.
Technical rept.,
Sally L. Richardson, and Betsy B. Washington. Jan 80, 66p NOAA-TR-NMFS-CIRC-430, NOAA-80032401

Knowledge of identification of cottid larvae taken in plankton collections off Oregon is summarized. Included are descriptions of 21 kinds of cottid larvae representing at least 14 of the 40 genera of cottids reported to occur in the northeast Pacific between Baja California and the Aleutian Islands. Larvae of Artedius harringtoni, Chitonotus pugetensis, Clinocottus acuticeps, Icelinus spp., Paricelinus hopliticus, Radulinus asprellus, R. boleoides, and four unidentified types are described for the first time. A larval series of a second kind of Artedius is described with a discussion of problems of specific identification. New and comparative information is provided for larvae.

PB80-176654 PC **A02**
Woods Hole Oceanographic Institution, MA.
Measures of Diversity with Unbiased Estimates,
Woollcott Smith, J. Frederick Grassle, and David Kravitz. c1979, 20p NOAA-80032704
Grants NOAA-04-6-159-44016, NSF-OCE76-21968
Pub. in Ecological Diversity in Theory and Practice, v6 p177-191 1979.

The results of Smith and Grassle (1977) for the family of expected species diversity measures are reviewed. These results are applied to estimating variability in local diversity in the deep sea from small benthic cores. These results are extended to a wider class of diversity indices including a modification of Brillouin's index. Finally, unbiased estimation methods are applied to the estimation of species-area diversity. (Copyright (c) 1979 by International Co-operative Publishing House.)

PB80-176704 PC **A02**
Alaska Univ., Fairbanks. Inst. of Marine Science.
Examination of a Reproductive Cycle of 'Protothaca staminea' Using Histology, Wet Weight-Dry Weight Ratios, and Condition Indices,
Howard M. Feder, James C. Hendee, Pat Holmes, George J. Mueller, and A. J. Paul. Oct 79, 11p CONTRIB-379, NOAA-80032003
Grant NOAA-04-3-158-41
Pub. in The Veliger, v22 n2 p182-187, 1 Oct 79.

The annual reproductive cycle is described for the littleneck clam, Protothaca staminea, in Prince William Sound, the northern limit of its range. Reproductive activity was determined by histological examination of gonads and by calculation of monthly dry meat-wet meat weight ratios and condition indices. Histological examinations suggest that females and males are in a spawning phase from June until September and June to January, respectively. However, dry weight-wet weight ratios indicate a limited spawning in late May with continued spawning during June. Condition indices indicate intensive spawning in June.

PB80-176720 PC **A02**
Oregon State Univ., Corvallis. Dept. of Microbiology.
Fish Health Management in Aquaculture,
J. S. Rohovec, and J. L. Fryer. 1979, 22p
ORESU-R-79-020, NOAA-80032110
Grant NOAA-04-M01-144
Pub. in Aquaculture: A Modern Fish Tale, SEMIN WR 026-79, July 1979, p15-35.

Infectious agents of Pacific Northwest salmonids are discussed. Viral, bacterial, protozoan and fungal diseases are included. Methods used for controlling these pathogens are described.

PB80-176746 PC **A02**
Oregon State Univ., Newport. Marine Science Center.
Structure and Life Cycle of 'Trypanoplasma beckeri' sp. n. (Kinetoplastida), a Parasite of the Cabezon, 'Scorpaenichthys marmoratus', in Oregon Coastal Waters,
Eugene M. Burreson. c1979, 6p ORESU-R-79-021, NOAA-80032107
Grant NOAA-04-5-158-2
Pub. in Jnl. of Protozoology, v26 n3 p343-347 1979. Also pub. as Virginia Inst. of Marine Science, Gloucester Point, Contrib-908.

Structure of Trypanoplasma beckeri sp. n. from the cabezon, Scorpaenichthys marmoratus (Ayres), is described from living specimens and from both Giemsa-, and protargol-stained smears. Flagellates from fish blood were usually long and slender. The recurrent flagellum bordered the body and terminated as a very short free flagellum. No true undulating membrane was observed, but in living individuals the recurrent flagellum undulated rapidly near its point of origin. The oval nucleus was located near the anterior end of the body. An argentophilic, aciculum-like structure appeared to connect the nucleus to the area at the base of the flagella. The kinetoplast was not observed in fish blood forms. On the basis of laboratory experiments, the leech, Malmiana diminuta was ascertained to be the vector for T. beckeri.

PB80-177074 PC **A02**
Oregon State Univ., Newport. Marine Science Center.
The Thermal Regime of an Intertidal 'Mytilus californianus' Conrad Population on the Central Oregon Coast,
David W. Elvin, and Jefferson J. Gonor. c1979, 18p ORESU-R-79-019, NOAA-80032106
Grant NOAA-04-3-158-4
Pub. in Jnl. of Exp. Mar. Biol. Ecol., v39 p265-279 1979.

Data describing the thermal environment of an intertidal population of Mytilus californianus Conrad were collected over a four-year period. A formula estimating tissue temperature during exposure to air was established and used to calculate the internal temperature of mussels each hour of the day in a mussel bed located at +3 ft above mean low water level. The resulting thermal regime was then discussed in terms of average temperature, daily extremes, and periods of heating and cooling. From experiments using radioactive labelled Isochrysis it was found that periods of exposure lead to increased assimilation efficiency. The thermal regime was used to calculate scope for growth by incorporating both its acute and acclimatizing effects on oxygen consumption, filtration rate, and assimilation. Particulate food levels had a greater effect upon seasonal values for scope for growth than temperatures within the normal environmental range. An energy budget was established for animals at various heights in the intertidal to produce a quantitative picture of the decrease in scope for growth with height. An exposure period may lead to slight increases in energy available for growth during winter. Maximum temperature changes may induce spawning at advantageous times. The implications for reconstructing and predicting thermal regimes of intertidal animals are discussed. (Copyright (c) Elsevier/North-Holland Biomedical Press, 1979.)

8B. Cartography

AD-A082 663/6 PC **A05**/MF **A01**
Naval Surface Weapons Center Dahlgren Lab VA
Terrestrial and Celestial Cartography,
A. V. Hershey. May 79, 88p Rept no. NSWC/DL-TR-3789

World Data Bank I has been reordered in such a way that the latitudes where coastlines cross meridians are sorted in order of latitude for each minute of longitude. Whether a satellite position is over sea or over land is determined by the parity of the next lower crossing. Stellar data on distance and velocity as well as direction are given in a small catalog. Boundary data for moon maria, constellations, and the Milky Way are given in a set of files. (Author)

N80-20674/1 PC **A05**/MF **A01**
Institut fuer Angewandte Geodaesie, Frankfurt am Main (Germany, F.R.).
Reports on Cartography and Topographical Measurements. Series 1: Original Report No. 74 Nachrichten Aus Dem Karten- und Vermessungswesen. Reihe 1: Originalbeitraege Heft Nr. 74.
1978, 78p REPT-74
Text in German; English Summary.

No abstract available.

N80-20679/0 PC **A07**/MF **A01**
Institut fuer Angewandte Geodaesie, Frankfurt am Main (Germany, F.R.).
Reports on Cartography and Topographical Measurements. Series 2: Translations.
1978, 127p REPT-35

No abstract available.

N80-20705/3 PC **A09**/MF **A01**
Institut fuer Angewandte Geodaesie, Frankfurt am Main (Germany, F.R.).
Reports on Cartography and Topographical Measurements. Series 1: Original Reports Nachrichten Aus Dem Karten und Vermessungswesen. Reihe 1: Originalbeitraege Heft No. 77.
1978, 179p REPT-77, ISSN-0469-4236
Text in German; English Summary. Original Contains Color Illustrations.

No abstract available.

N80-20714/5 PC **A03**/MF **A01**
Institut fuer Angewandte Geodaesie, Frankfurt am Main (Germany, F.R.).
Information Relative to Cartography and Geodesy. Series 2: Translations.
1978, 44p REPT-37, ISSN-0469-4244

No abstract available.

8C. Dynamic Oceanography

AD-A082 455/7 PC **A11**/MF **A01**
Woods Hole Oceanographic Institution MA
1979 Summer Study Program in Geophysical Fluid Dynamics at the Woods Hole Oceanographic Institution, Notes on Polar Oceanography. Volume II. Lectures of the Fellows.
Technical rept.,
Melvin E. Stern, and Florence K. Mellor. Nov 79, 226p Rept no. WHOI-79-84-VOL-2
Contract N00014-79-C-0671
See also Volume 1, AD-A082 511.

This volume contains the manuscripts of research lectures by the nine fellows of the summer program. Some reports are obviously related to the main theme; some are related to crucial physical processes in the Polar Oceans; some are pure fluid dynamics or related to particular educational goals of the fellows. These lecture reports have not been edited or reviewed in a manner appropriate for published papers, but we hope that several of them have the beginnings of an idea which will eventually find its way into the literature. Therefore, readers who wish to reproduce any parts of these 'Unpublished Manuscripts' should seek permission directly from the authors. Seven of the fellows were supported by ONR, NASA and NOAA. One of the fellows was supported by The West German Government through the Max Plank Institute for Meteorology, and one of the fellows was supported by the Canadian Government through the Institute of Ocean Sciences. (Author)

AD-A082 511/7 PC **A12**/MF **A01**
Woods Hole Oceanographic Institution MA
1979 Summer Study Program in Geophysical Fluid Dynamics at the Woods Hole Oceanographic Institution. Notes on Polar Oceanography. Volume I. Course Lectures on Polar Oceanography.
Technical rept.,
Melvin E. Stern, and Florence K. Mellor. Nov 79, 251p Rept no. WHOI-79-84-VOL-1
Contract N00014-79-C-0671
See also Volume 2, AD-A082 455.

Partial Contents: Global Oceans, Subtropical Gyres One, Subtropical Gyres Two, The Polar - Subpolar Influence One, Polar - Subpolar Influence Two, Antarctic Intermediate Water: Formation and Influence, Polar - Subpolar Influence Three, Theories of the Antarctic Circumpolar Current, and The Northern Sea.

AD-A082 782/4 Not available NTIS
Defence Research Establishment Pacific Victoria (British Columbia)
A Fast Response Surface-Wave Slope Meter and Measured Wind-Wave Moments,
B. A. Hughes, H. L. Grant, and R. W. Chappell. 2 Feb 77, 16p Rept no. DREP-REPRINT-78-4
Availability: Pub. in Deep-Sea Research, v24 p1211-1223 1977 (No copies furnished by DTIC).

No abstract available.

AD-A083 014/1 PC **A06**/MF **A01**
Naval Underwater Systems Center Newport RI
The Windwave and Turbulence Observation Program (WAVTOP). The Measurement of Parameters Controlling Downward Mixing of Oil from the Sea Surface.
May 79, 103p USCG-D-68-79
Contract MIPR-Z-70099-7-71825-A

The wave and turbulence observation program (WAVTOP) has developed instrumentation and techniques to gather field data of the wind-generated motions in the upper ocean. The sensor package (BLT) includes small fast-response impellers and a capacitance wave staff system to measure particle velocity components and free surface elevation to determine shear, kinetic and potential energy content, and Reynolds stresses in the upper 5-10m. The battery-powered recording system utilizes a microprocessor digitizer programmable for data sampling. Preliminary measurements were made with the BLT mounted on the AESOP Stable Spar Buoy and from a fixed boom on Gould Island. Results portray kinetic energy attenuating exponential with depth and correlating with the local wind speed. The vertically integrating energy appears to correlate with the cube of the wind speed with a 15-20 min time lag. Auto-spectra of the velocity data display narrow peaks demonstrating the monochromaticity of small wind waves. The spectra verify the attenuation of the wave energy with depth. Higher frequency (wave number) energy persists at deeper depths suggesting the presence of ambient turbulence. Reynolds stresses show fluctuations with time but display downward momentum flux and range from 1-2 dyne/cm2 for winds from 4-5 m/sec.

AD-A083 028/1 PC **A02**/MF **A01**
Massachusetts Inst of Tech Cambridge Dept of Earth and Planetary Sciences
Research in Oceanography at MIT, 1 October 1974 - 31 December 1979.
Final rept.,
John B. Southhard, John M. Edmond, John G. Sclater, Tanya Atwater, and Carl Wunsch. Mar 80, 12p
Contract N00014-75-C-0291

A summary is given on research preformed by 12 faculty members of the Dept. of Earth and Planetary Sciences and Meteorology at MIT. (Author)

PB80-168115 Not avilable NTIS
Oregon State Univ., Corvallis.
International Southern Ocean Studies of Circumpolar Dynamics,
Victor T. Neal, and Worth D. Nowlin, Jr. 1979, 12p NSF/IDOE-80-5
Pub. in Polar Record, v19 n122 p461-470 1979. Prepared in cooperation with Texas A and M Univ., College Station.

A proposal in 1973 for a long-term research program in physical oceanography of the Southern Ocean was prepared. The program is designed to improve understanding of the Antarctic Circumpolar Current. A sequence of kinematical and dynamical field experiments have been initiated, including long-term monitoring of temperature and velocity of the Antarctic Circumpolar Current in Drake Passage, and field studies of the polar frontal zone and winter oceanographic conditions beneath the sea ice.

PB80-168891 Not available NTIS
Washington Univ., Seattle. Dept. of Oceanography.
On the Generation of the Seasonal Coastal Upwelling in the Gulf of Guinea,
Allan J. Clarke. c1979, 10p CONTRIB-1079, NSF/IDOE-80-2
Grant NSF-IDO75-03998
Pub. in Jnl. of Geophysical Research, v84 nC7 p3743-3751, 20 Jul 79.

Seasonal upwelling in the coastal waters of the Gulf of Guinea is unusual because classical coastal upwelling theory does not even qualitatively hold there; there is no significant relationship between the upwelling and the local longshore wind stress. In this paper an attempt is made to qualitatively explain the Gulf of Guinea seasonal upwelling using coastal trapped forced wave dynamics. Two independent sets of data were used to compare theory with observation. Both indicate that provided dissipation of the travelling wind-forced wave is taken into account, the theory agrees qualitatively with observation. The implication is that the upwelling is generated by coastal wind forcing several hundred kilometers east of the upwelling region. The Gulf of Guinea coastal upwelling therefore does not seem to be related to upwelling generated along the equator or to deep ocean basin forcing--it is not an 'anti El Nino,' as has been postulated elsewhere. (Copyright (c) 1979, by the American Geophysical Union.)

PB80-169956 PC **A03**/MF **A01**
Woods Hole Oceanographic Institution, MA.
Measurement of Nearsurface Current in Cape Cod Using Sighted Drogues.
Technical rept.,
James H. Churchill, and Bert Pade. Jan 80, 49p WHOI-80-8
Contract DE-AC02-79EV10005

During July 16-19, 1979, currents in Cape Cod Bay from the very near surface to 1.8 m were measured by taking simultaneous bearings on submerged drogues from two anchored vessels. The error in drogue position as a function of location with respect to the two vessels was examined in detail and was used for rejecting or accepting velocities from particular sightings. From the final results well defined velocity shears, nearly parallel with the wind, were evident. From these velocity fields, surface stress coefficients, equivalent sand-grain roughness coefficients, and the near surface gradients of relative (to the surface velocity) velocity were calculated.

PB80-170129 PC **A05**/MF **A01**
Martin Marietta Corp., Baltimore, MD. Environmental Center.
Analysis of Patuxent Estuarine Currents in the Vicinity of the Chalk Point Steam Electric Station.
Final rept.,
T. T. Polgar, R. N. Ross, and Gail K. Lacey. Mar 80, 83p PPSP-CP-80-3
Prepared in cooperation with Academy of Natural Sciences of Philadelphia, PA. Sponsored in part by Potomac Electric Power Co., Washington, DC.

The tidal and nontidal flows in the Patuxent River, between Trueman Point and Benedict Bridge, are described in this paper, using time series analysis methods on continuously recording current meter data. The measurements were made in July and August 1978; the entire study area falls within the mesohaline region of the estuary. The results of the analyses indicate that currents in the study area are driven predominantly by semi-diurnal tidal forcing and by wind patterns. Freshwater input into the estuary accounts for the maintenance of vertical density gradients and shears, but it plays a relatively minor role in the estuarine transport processes.

PB80-170707 PC **A05**/MF **A01**
Woods Hole Oceanographic Institution, MA.
Calculation of Mean Seasonal Sea Surface Elevation Fields Over the North Atlantic Continental Shelf and Slope Using Historical Hydrostation Data.
Technical rept.,
James H. Churchill. Feb 80, 93p WHOI-80-9
Contract DE-AC02-79EV10005

This report details the calculation and results of a simple coastal elevation field model which was presented in a recent paper. Seasonal mean sea surface elevation fields were calculated over the shelf slope region off the east coast of North America north of Cape Hatteras by applying the model to a grid of averaged sigma-t's at standard depths. The sigma-t grid was calculated using a data base of approximately 30,000 hydrographic stations. Difficulties involved with the numerical implementation of the model and economizing adaptations to the WHOI-NODC data processing program, OCCOMP, are discussed.

8D. Geochemistry

IDO-78-1701.b.3.3 PC **A03**/MF **A01**
Utah Univ. Research Inst., Salt Lake City.
Initial Investigation of Soil Mercury Geochemistry as an Aid to Drill Site Selection in Geothermal Systems.
R. M. Capuano, and R. W. Bamford. Dec 78, 41p
Contract EG-78-C-07-1701

A mercury-in-soil survey was conducted at the Roosevelt Hot Springs Known Geothermal Resource Area (KGRA), Utah, to evaluate mercury soil geochemistry as a method of selecting exploration well sites in a hot-water geothermal system. Samples of -80 mesh soil were collected at 30.5 m intervals along traverses crossing known structures, surficial geothermal alteration, and exploration well sites, and were analyzed using a Gold Film Mercury Detector. Strong mercury anomalies occur at locations along known structures in close proximity to subsurface thermal activity; examples include areas over hot spring deposits and near a shallow producing well. In contrast, background mercury concentrations are present in nearby locations with little or no indication of subsurface thermal activity, such as areas around deep marginal producing wells and dry wells, and areas lacking hot spring deposits. These results indicate that mercury geochemical surveys can be useful

for identifying and mapping structures controlling fluid flow in geothermal systems and for delineating areas overlying near-surface thermal activity. Soil mercury geochemistry thus provides information which may aid in the cost-effective selection of exploratory well sites. (ERA citation 05:011734)

8E. Geodesy

AD-A082 651/1 PC A02/MF A01
Joint Inst for Lab Astrophysics Boulder CO
Plans for the Development of a Portable Absolute Gravimeter with a Few Parts in 10 to the 9th Power Accuracy.
Final rept. 1 Oct 78-30 Sep 79,
James E. Faller, Robert L. Rinker, and Mark A. Zumberge. 24 Mar 78, 12p AFGL-TR-80-0074
Contract ESD-9-800
Pub. in Tectonophysics, v52 p107-116 1979.
Availability: Microfiche copies only.

No abstract available.

AD-A083 034/9 PC A03/MF A01
Ohio State Univ Columbus Dept of Geodetic Science
Optimal Estimation from Data Regularly Sampled on a Sphere with Applications in Geodesy.
Interim rept.,
Oscar L. Colombo. Sep 79, 36p DGS-291, SCIENTIFIC-1, AFGL-TR-79-0227
Contract F19628-79-C-0027

The size of the variance-covariance matrix of the data, used to obtain minimum variance estimators for collocation, is as large as the number of observations in the data set. For some arrangements of the data, such as the usual 'equal angle' (or 'regular') grid, the matrix presents a very strong Toeplitz-circulant structure that can be exploited to reduce computing in setting-up and inverting the matrix. This reduction can be quite drastic. This report discusses such structure and presents an algorithm for implementing collocation efficiently. Three applications are considered: (a) the spherical harmonic analysis of point data; (b) the same analysis using area means; (c) the estimate of the disturbing potential from gravity anomalies. The harmonic analysis is optimal for noisy data as well; with noiseless data it provides harmonic coefficients with minimum aliasing. (Author)

AD-A083 035/6 PC A02/MF A01
Ohio State Univ Columbus Dept of Geodetic Science
Accuracy Estimates of 1 deg x 1 deg Mean Anomaly Determinations from a High-Low SST Mission.
Interim rept.,
Richard H. Rapp, and D. P. Hajela. Sep 79, 17p DGS-295, SCIENTIFIC-3, AFGL-TR-79-0269
Contract F19628-79-C-0027

The method of least squares collocation is used to estimate the accuracy and correlation of 1 degree x 1 degree anomalies that could be determined from a high-low satellite to satellite tracking mission. The observed data is taken to be the line of sight acceleration which can be computed from the range rate data. Variables considered in this study were: a) the spherical distance from the center of the 1 deg x 1 degree block within which data is selected for use; b) the accuracy of the 'observed' accelerations; c) the height of the low satellite; and d) the data density or interval. Typical results indicate the at a low satellite height of 200 km, a data noise corresponding to a range accuracy of + or - 0.015 cm/sec, would yield a 1 degree x 1 degree anomaly to an accuracy of about + or - 8 mgals with an average error correlation coefficient between adjacent blocks of -0.6. Lowering the satellite to 150 km reduces the accuracy to about + or - 5 mgals but increases the correlaton to about -0.9. This study does not consider the effects of orbit error, nor errors in the degree 12 reference field. In addition, some results could not be obtained when stable matrix inversions could not be obtained. This occured when dense data and/or low data noise was being used. (Author)

IDO-1601-T10 PC A04/MF A01
Utah Univ., Salt Lake City. Dept. of Geology and Geophysics.
Precision Leveling and Gravity Studies at the Roosevelt Hot Springs KGRA, Utah. Final Report: Volume 77-9.
K. L. Cook, and J. A. Carter. Mar 78, 60p
Contract EY-76-S-07-1601

The objective of the precision leveling and gravity surveys in the Roosevelt Hot Springs KGRA, Utah, is to provide a baseline for detecting mass reduction or movement (displacement) related to injection or withdrawal of geofluids or to changes in tectonic strain, or both of these effects. The precision leveling and gravity data obtained during the period September 1975 through October 31, 1977 are presented, and interpretations of the data are made. (ERA citation 05:010011)

LA-8154-MS PC A02/MF A01
Los Alamos Scientific Lab., NM.
Gravity Study of the Los Alamos Area, New Mexico.
L. M. Williams. Nov 79, 21p
Contract W-7405-ENG-36

Profiles of gravity readings have been observed along two CXC seismic reflection lines recently recorded in Los Alamos County; one in Los Alamos Canyon, the other in Mortandad Canyon and on Sigma Mesa. These data have been merged with available gravity data in the Los Alamos area and a density profile across Los Alamos Canyon has been modeled to find the proper reduction density. The resulting Bouguer gravity map of the Pajarito Plateau suggests the basement deepens to the northeast. Two-dimensional computer modeling of the gravity profiles indicates that subsurface lenses of Tschicoma Formation along the west edge of the Pajarito Plateau may act as an effective basement, obscuring actual basement structures in that area. Thus, an alternative to the graben interpretation of the prominent gravity low in the area is that this low is due to density contrasts within the thick sequences of Quaternary volcanics present. (ERA citation 05:012690)

N80-20638/6 PC A11/MF A01
Institut fuer Angewandte Geodaesie, Frankfurt am Main (Germany, F.R.).
Reports on Cartography and Geodesy. Series 1: Original Report No. 73 Nachrichten Aus Dem Karten und Vermessungswesen. Reihe 1: Originalbeitraege Heft Nr. 73.
1977, 246p REPT-73
Text in German. Original Contains Color Illustrations.

No abstract available.

N80-20691/5 PC A09/MF A01
Bayerische Akademie der Wissenschaften, Munich (Germany, F.R.).
Research Program 78, Satellite Geodesy Program die Arbeiten des Sonderforschungsbereiches 78 Satellitenfeodaesie im Jahr 1977.
M. Schneider. 1978, 177p ASTRON-GEODAET-ARB-38, ISBN-3-76969-781-2
In German; English Summary.

No abstract available.

N80-20974/5 PC A04/MF A01
Institut fuer Angewandte Geodaesie, Frankfurt am Main (Germany, F.R.).
Astrogravimetric Determination of the Geoid Ein Verfahren Zur Astro-Gravimetrischen Geoidbestimmung.
Ph.D. Thesis - Tech. Hochschule Darmstadt, West Germany.
D. Leigemann. 1978, 51p SER-C/DISS-247-MITT-147
Text in German.

The computation of the geoid by several methods, including the Runge-Krarup theorem, is discussed using data taken in Germany. The use of a series of Kernel functions and the interpolations by astrogravimetric methods are reproduced for the German field.

N80-20975/2 PC A05/MF A01
Institut fuer Angewandte Geodaesie, Frankfurt am Main (Germany, F.R.).
Differential Geometry Applied to Geodesy in the Case of the Gravity Field of the Earth ueber Geodaetische Differentialgeometrie im Erdschwerefeld.
Ph.D. Thesis - Tech. Hochschule, Darmstandt, West Ger.
J. Brennecke. 1979, 91p SER-C/DISS-250-MITT-148
Text in German.

Applications of three dimensional geodesy in the domain of geometric representations of the gravitational field are presented. The method of calculation, based on Cartan and differential geometry in a Euclidean space, is used with a three dimensional orthonormal moving reference system. The study of the curvatures, considered as a fundamental parameter for the geometry of the gravitational field, aids in calculating exactly or approximately in three dimensional geodesy.

PB80-169758 PC A03/MF A01
Denver Research Inst., CO. Office of International Programs.
Thailand: The Introduction of Mint Agriculture,
Ronald P. Black, and Sachee Piyapongse. Dec 79, 30p
Contract AID/ta-C-1337
Report on Industrial Research Institutes: Their Role in the Application of Appropriate Technology and Development, Case Series No. 5.

The case history has been written to assist development planners, personnel of industrial research institutes, and USAID mission personnel in understanding the role that IRIs can and do play in the application of technology to development. It describes how mint agriculture and processing were introduced in Thailand. It also details how farming, mint oil extraction, menthol production, and related research activities were developed. The research organizations involved in the process are also examined.

PB80-173883 PC A04/MF A01
National Ocean Survey, Rockville, MD. Office of Program Development and Management.
National Ocean Survey Abstracts - 1978.
Dec 79, 55p NOAA-80031107
See also report dated Oct 78, PB-288 986.

The National Ocean Survey (NOS) provides charts and related information for the safe navigation of marine and air commerce. NOS also furnishes other Earth science data from geodetic, hydrographic, oceanographic, geomagnetic, seismologic, gravimetric, and astronomic surveys, observations, investigations, and measurements. NOS Abstracts is an annual compilation of all scientific and technical papers, reports, and oral presentations published or produced by National Ocean Survey authors in a given calendar year.

8F. Geography

N80-20717/8 PC$10.50
National Aeronautics and Space Administration, Washington, DC.
Earth Resources. A Continuing Bibliography with Indexes, Issue 24.
Jan 80, 91p NASA-SP-7041(24)

This bibliography lists 345 reports, articles, and other documents introduced into the NASA scientific and technical information system between October 1, 1979 and December 31, 1979. Emphasis is placed on the use of remote sensing and geophysical instrumentation in spacecraft and aircraft to survey and inventory natural resources and urban areas. Subject matter is grouped according to agriculture and forestry, environmental changes and cultural resources, geodesy and cartography, geology and mineral resources, hydrology and water management, data processing and distribution systems, instrumentation and sensors, and economic analysis.

PB80-168693 PC A11/MF A01
National Research Council, Washington, DC. Board on Science and Technology for International Development.

L'Espace et les Ressources Terrestres: Perspectives de la Teledetection pour les Pays en Voie de Developpement (Resource Sensing from Space: Prospects for Developing Countries).
Final rept.
Apr 80, 235p CIR/BOSTID-80/23F
Contract AID/ta-C-1433
Text in French. See also English version, PB-264 171.Color illustrations reproduced in black and white.

No abstract available.

8G. Geology and Mineralogy

AD-A082 594/3 PC **A02**/MF **A01**
Louisiana State Univ Baton Rouge Coastal Studies Inst
Submarine Landslides - Geometry and Nomenclature.
Technical rept.,
David B. Prior, and James M. Coleman. 1979, 15p Rept no. TR-298
Contract N00014-75-C-0192
Pub. in Zeitschrift fur Geomorphologie. v23 n4 p415-426 Dec 79.

No abstract available.

AD-A082 596/8 PC **A02**/MF **A01**
Lamont-Doherty Geological Observatory Palisades NY
Middle and Late Pliocene Diatom Datum Levels from the Central Pacific.
Journal article,
Lloyd H. Burckle, and Jessie Trainer. 28 Nov 78, 15p Rept no. LDGO-2822
Contract N00014-75-C-0210
Pub. in Micropaleontology, v25 n3 p281-293 1979.

No abstract available.

AD-A082 659/4 PC **A02**/MF **A01**
Lamont-Doherty Geological Observatory Palisades Ny
Some Remarks on Isostasy and the Long-Term Behavior of the Continental Lithosphere.
Journal article,
James R. Cochran. 8 May 79, 10p Rept no. LDGO-2782
Contract N00014-75-C-0210, Grant NSF-OCE77-07941
Pub. in Earth and Planetary Science Letters, v46 p266-274 1980.

No abstract available.

COO-4342-1 PC **A02**/MF **A01**
Massachusetts Inst. of Tech., Cambridge.
Magnetotelluric Interpretations in a Crustal Environment. Semi-Annual Progress Report, June 1, 1977-December 30, 1977.
T. R. Madden. Feb 78, 24p
Contract EG-77-S-02-4342

A generalized thin layer analysis is described which includes a conductive layer and a resistive layer into a single layer. The equations describing the thin layer effects are reviewed and examples of comparisons between thin layer and generalized thin layer calculations are shown. Implementation of multiple scale analysis to allow the handling of large models in reasonable fashion was investigated. Some tests of these ideas on one-dimensional models are described. (ERA citation 05:011724)

COO-4342-2 PC **10**//MF **A01**
Massachusetts Inst. of Tech., Cambridge.
Magnetotelluric Interpretations in a Crustal Environment. Semi-Annual Report, 1 January 1978-30 June 1978.
T. R. Madden. Jun 78, 208p
Contract EG-77-S-02-4342

Crustal variations in the conductivity and resistivity of the earth cause great complications in the surface distribution of electric currents and fields. At low frequencies the crust can be treated as a thin sheet, and the crustal conductivity variations can be incorporated into the thin sheet conductance variation. In the first model developed in this thesis, the layer below the thin sheet is a layer of finite conductivity. Thus the thin sheet model consists of a thin conducting sheet of variable conductivity over a general layered medium. In the earth the resistive layer below the surface conductive sheet is represented by the lower crust. The resistivity of the lower crust underneath the ocean is expected to be different from the resistivity of the lower crust below the continents. This difference in the lower crust resistivity value is taken into account in the Generalized Thin Sheet model. In this model the thin sheet is treated as an anisotropic thin sheet with different (parallel) conductivity and (perpendicular) resistivity variations. Specific examples in which conductivity and resistivity vary only in one direction were studied. It was found that in a crustal environment, approximation being made, it is possible to get simple analytical solutions for E variations perpendicular to the strike direction. Electric fields measured at a point are influenced not only by the conductivity and the resistivity of the medium at the point of measurement, but also by the electrical properties of the medium a considerable distance away. The method of imbedding was developed in which fields close to the point of measurement are computed at close spacings, while fields farther away are determined at larger spacings. These methods were applied to modelling magnetotelluric measurements on the island of Oahu. 107 figures, 13 tables. (ERA citation 05:012695)

COO-4392-2 PC **A04**/MF **A01**
Woods Hole Oceanographic Institution, MA. Dept. of Chemistry.
Organic Geochemistry of Continental Margin Sediments.
J. M. Hunt, J. K. Whelan, A. Y. Huc, and M. Pratt. 1979, 65p
Contract EG-77-S-02-4392

Well cuttings from two offshore Gulf Coast stratigraphic test wells (South Padre and Mustang Island) have been analyzed for C sub 7 -C sub 15 hydrocarbon distributions by thermal distillation-pyrolysis GC, for C sub 1 -C sub 7 hydrocarbons by headspace analysis and for C sub 15+ hydrocarbons by extraction. The results from the South Padre well show that the threshold of intensive hydrocarbon generation starts around 10,000 feet and peaks around 14,000 feet. The distribution of individual homologs within each hydrocarbon group indicates that the more volatile members are migrating upward from the generation zone. Thus, n-pentane (C sub 5) peaks at 10,000 feet, and the higher homologs, C sub 5 , C sub 6 , C sub 7 , C sub 8 and C sub 10 peak at successively greater depths to 15,000 feet. Benzene also peaks before toluene which peaks before the xylenes. This phenomena was not observed in the Mustang Island well where organic carbon contents and hydrocarbon yields were lower, apparently too low to induce migration. C sub 1 -C sub 7 hydrocarbon distributions also were studied by the headspace technique in offshore samples from the East Coast, Gulf of California and Gulf of Maine. Hydrocarbon yields from wells east of Cape Hatteras and on the Blake-Bahama Plateau were much lower than in most other areas analyzed to date. Some Gulf of California samples had high gas yields due to hydrothermal intrusions and igneous dikes raising sediment temperatures. Gulf of Maine samples were unique in having no aromatic hydrocarbons. (ERA citation 05:011203)

DS-1972-11 PC **A07**/MF **A01**
Stiftelsen Svensk Detonikforksning, Stockholm (Sweden).
Analysis of the State of Strain around Different Geometries with Radial Cracks in an Indefinite Medium Due to Expansive Forces.
F. Ouchterlony. Aug 72, 149p
In Swedish.
U.S. Sales Only.

The break up of fragile materials due to internal expansive forces for instance at rock blasting is going on by the growth of radial cracks. This process has been studied in this report by an analysis of the state of strain around different geometries with radial cracks in an indefinite medium. Fracture properties such as stress intensity factors, probable growing direction for the crack as well as the crack volume have been calculated. The results are given in graphs and tables. (Atomindex citation 10:461977)

EGG-2004 PC **A02**/MF **A01**
Idaho National Engineering Lab., Idaho Falls.
Geochemical Modeling of the Raft River Geothermal Field.
H. L. Overton, R. E. Chaney, R. E. McAtee, and D. L. Graham. Nov 79, 19p
Contract EY-76-C-07-1570

The results to date of chemical modeling of the Raft River KGRA are presented. Earlier work indicated a northwest-southeast anomaly in the contours. Modeling techniques applied to more complete data allowed further definition of the anomaly. Models described in this report show the source of various minerals in the geothermal water. There appears to be a regional heat source that gives rise to uniform conductive heat flow in the region, but convective flow is concentrated near the upwelling in the Crook well vicinity. Recommendations are made concerning field expansion and additional work needed to refine the overall reservoir model. (ERA citation 05:010012)

E80-10087 PC **A14**/MF **A01**
National Aeronautics and Space Administration, Greenbelt, MD. Goddard Space Flight Center.
Earth Survey Applications Division Research Report - 1979.
Annual rept. no. 2,
Lloyd Carpenter. Jan 80, 323p NASA-TM-80642
Original contains imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, SD. 57198.Color illustrations reproduced in black and white.

Accomplishments and future plans are described for the following areas: (1) geology - geobotanical indicators and geopotential data; (2) modeling magnetic fields; (3) modeling the structure, composition, and evolution of the Earth's crust; (4) global and regional motions of the Earth's crust and earthquake occurrence; (5) modeling geopotential from satellite tracking data; (6) modeling the Earth's gravity field; (7) global Earth dynamics; (8) sea surface topography, ocean dynamics, and geophysical interpretation; (9) land cover and land use; (10) physical and remote sensing attributes important in detecting, measuring, and monitoring agricultural crops; (11) prelaunch studies using LANDSAT D; (12) the multispectral linear array; (13) the aircraft linear array pushbroom radiometer; and (14) the spaceborne laser ranging system.

HIG-78-8 PC **A06**/MF **A01**
Hawaii Inst. of Geophysics, Honolulu.
Seismic Studies on Kilauea Volcano, Hawaii Island. Geothermal Resources Exploration in Hawaii: Number 5.
W. Suyenaga, M. Broyles, A. S. Furumoto, R. Norris, and M. D. Mattice. Nov 78, 124p
Contract EY-76-C-03-1093

This volume contains six reports on seismological studies done in conjunction with other geophysical and geochemical studies of the Hawaii Geothermal Project. The studies were conducted on the easternmost portion of the East Rift Zone of Kilauea volcano, near the eventual site of the initial well, HGP-A, drilled by the Hawaii Geothermal Project. Separate abstracts were prepared for each report. (ERA citation 05:011725)

IDO-1601-T14 PC **A03**/MF **A01**
Utah Univ., Salt Lake City. Dept. of Geology and Geophysics.
Fluid Dynamic Properties of Rhyolitic Magmas, Mineral Mountains, Utah. Part I: Volatile Content and Flow Characteristics. Part II: Physical Properties.
W. P. Nash, and S. H. Evans, Jr. Jul 78, 47p
Contract EY-76-S-07-1601

Rhyolites from southwestern Utah are described that display striking dissimilarities in morphology which are attributed to viscosity differences due to variations in water content. Temperature effects and fluorine concentrations are unable to account for the observed differences in morphology. Fluid dynamic calculations indicate that rhyolite flows of fluid aspect contained between 1 and 3 percent water upon eruption. More viscous domes contained less water which was expelled in pyroclastic eruptions preceeding emplacement of the domal rhyolite magma. The results of calculations are presented that determine the physical properties of rhyolite magmas in the Mineral Mountains. Data are presented on density, molar volume, heat ca-

pacity, gram formula mass, dynamic viscosity, thermal conductivity, thermal diffusivity, kinematic viscosity, and coefficient of thermal expansion. (ERA citation 05:011808)

IDO-1601-T16 PC **A09**/MF **A01**
Utah Univ., Salt Lake City. Dept. of Geology and Geophysics.
Gravity and Ground Magnetic Surveys in the Monroe and Joseph KGRA'S and Surrounding Region, South Central Utah.
M. E. Halliday, and K. L. Cook. Jun 78, 183p
Contract EY-76-S-07-1601
Thesis.

Regional gravity data were collected in portions of the Pavant Range, Tushar Mountains, northern Sevier Plateau, the Antelope Range, and throughout Sevier Valley approximately between the towns of Richfield and Junction, Utah. Additionally, detailed gravity and ground magnetic data were collected in the vicinity of hot springs in both the Monroe and Joseph Known Geothermal Resource Areas (KGRA's) and subsurface geologic models were constructed. The regional gravity data were terrain corrected out to a distance of 167 km from the station and 948 gravity station values were compiled into a complete Bouguer gravity anomaly map of the survey area. This map shows a strong correlation with most structural features mapped in the survey area. Four regional gravity profiles were modeled using two-dimensional formerd and inverse algorithms. (ERA citation 05:011732)

IDO-1601-T5 PC **A02**/MF **A01**
Utah Univ., Salt Lake City. Dept. of Geology and Geophysics.
Attempt at Paleomagnetic Dating of Opal, Roosevelt Hot Springs KGRA.
F. H. Brown. Feb 77, 15p
Contract EY-76-S-07-1601

The results of paleomagnetic investigation of a drill core from the Opal Dome at Roosevelt Hot Springs are reported. A log of the core from 1.5 to 16.8 m is given. (ERA citation 05:011718)

IDO-1601-T7 PC **A04**/MF **A01**
Utah Univ., Salt Lake City.
Quaternary Rhyolite from the Mineral Mountains, Utah, USA. Final Report, Volume 77-10.
S. H. Evans, Jr., and W. P. Nash. Mar 78, 63p
Contract EY-76-S-07-1601

A suite of silicic volcanic rocks is associated with the Roosevelt Hot Springs geothermal area in southwestern Utah. The volcanic sequence includes Tertiary rhyolite 8 My old and obsidian, ash and rhyolite of Quaternary age. The Quaternary lavas are characterized by high silica content (76.5% Si0 sub 2) and total alkalies in excess of 9 percent. Obsidians commonly contain greater amounts of fluorine than water. Two older flows (0.8 My) can be distinguished from younger dome and pyroclastic material (approximately 0.5 My) by subtle differences in their chemistry. The mineralogy of the rhyolites consists of alkali feldspar, plagioclase, and small amounts of Fe-Ti oxides, biotite, hornblende and rare allanite. Fe-Ti oxide temperatures are 740 to 785 exp 0 C for the flows and 635 to 665 exp 0 C for the domes; two feldspar temperatures give similar results. The phase relationships of bulk rock, glass and feldspar compositions demonstrate that the younger Quaternary rhyolites could have been derived from the earlier magma type, represented by the obsidian flows, by a process of crystal fractionation. The major phases which must fractionate are alkali feldspar, plagioclase and quartz with minor amounts of biotite, magnetite and ilmenite participating also. Trace element patterns support this scheme as well. The Tertiary lavas cannot be related to the Quaternary rhyolites and are thought to represent a separate event. (ERA citation 05:010004)

IDO-78-1701.b.1.1.3 PC **A07**/MF **A01**
Utah Univ., Salt Lake City. Research Inst.
Geology of Roosevelt Hot Springs KGRA, Beaver County, Utah.
D. L. Nielson, B. S. Sibbett, D. B. McKinney, J. B. Hulen, and J. N. Moore. Dec 78, 132p
Contract EG-78-C-07-1701

The Roosevelt Hot Springs KGRA is located on the western margin on the Mineral Mountains in Beaver County, Utah. The bedrock geology of the area is presented. It is dominated by metamorphic and plutonic rocks of Precambrian age as well as felsic plutonic phases of the Tertiary Mineral Mountains Pluton. Rhyolite flows, domes, and pyroclastics reflect igneous activity between 0.8 and 0.5 million years ago. All lithologies present in the map area are described in detail with an emphasis on characteristics which will allow them to be distinguished in drill cuttings. The geothermal system at Roosevelt Hot Springs KGRA is structurally controlled with reservoir rocks demonstrating little primary permeability. North to north-northeast trending faults are the youngest structures in the area, and they control present fumarolic activity and recent hot spring activity which has deposited opaline and chalcedonic sinters. It is proposed here that the geothermal reservoirs are controlled primarily by intersections of the principal zones of faulting. Logs from Thermal Power Utah State 72-16, Getty Oil Utah State 52-21, and six shallow thermal gradient holes drilled by the University of Utah are presented in this report and have been utilized in the construction of geologic cross sections of the geothermal field. (ERA citation 05:010006)

IDO-78-1701.a.1.1.5 PC **A03**/MF **A01**
Utah Univ., Salt Lake City. Dept. of Geology and Geophysics.
Hydrothermal Alteration at the Roosevelt Hot Springs Thermal Area, Utah: Modal Mineralogy, and Geochemistry of Sericite, Chlorite, and Feldspar from Altered Rocks, Thermal Power Company Well Utah State 14-2.
J. M. Ballantyne. Nov 78, 50p
Contract EG-78-C-07-1701

Sericites, chlorites, feldspars, biotite and hornblende from hydrothermally altered rocks at several depths in Thermal Power Company well Utah State 14-2, Roosevelt Hot Springs Thermal Area, Utah, have been analyzed using the electron microprobe. Sericites and ferromagnesian minerals have been analyzed for 12 major elements, and feldspars for 3. The results have been used, along with whole rock chemical analyses, to computer calculate modal mineralogy for samples from the drillhole. Calculated modes for hydrothermal minerals are in reasonable agreement with observations from thin sections. (ERA citation 05:011720)

LA-UR-79-2795 PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
Mechanism of Magma Mixing at Glass Mountain, Medicine Lake Highland Volcano, California.
J. C. Eichelberger. 1979, 21p CONF-791080-1
Contract W-7405-ENG-36
Oregon Department of Geology and Mineral Industries Volcanology symposium, Bend, OR, USA, 15 Oct 1979.

Mixing of basaltic and rhyolitic magmas at Glass Mountain appears to have been driven by vesiculation of basaltic magma as it intruded a rhyolitic magma chamber. Rapid cooling of basaltic magma formed a mafic foam which floated and became concentrated at the roof of the chamber. Foam-rich lava emerged first during the eruption, and became the hybrid dacite of the distal end of the flow. The chamber is probably a relatively large-volume, long-lived feature, lying within 10 km of the surface beneath the caldera. This mechanism of mixing between silicic magma stored in a crustal chamber and basaltic magma feeding the chamber is controlled by initial water content of basaltic magma, and implies that dry basaltic magma would remain at the base of the chamber. The eastward change from andesitic to bimodal volcanism in this portion of the Cascade Range may be due to an eastward decrease in water content of parental basaltic magmas. 6 figures, 1 table. (ERA citation 05:005022)

LA-UR-80-224 PC **A03**/MF **A01**
Los Alamos Scientific Lab., NM.
Thermomechanical Models of the Rio Grande Rift.
R. J. Bridwell, and C. A. Anderson. 1980, 35p
CONF-7904122-1
Contract W-7405-ENG-36
Conference on the mechanisms of continental drift and plate tectonics, Newcastle-upon-Tyne, UK, Apr 1979.

Fully two-dimensional, coupled thermochemical solutions of a continental rift and platform are used to model the crust and mantle structure of a hot, buoyant mantle diapir beneath the Rio Grande rift. The thermomechanical model includes both linear and nonlinear laws of the Weertman type relating shear stress and creep strain rate, viscosity which depends on temperature and pressure, and activation energy, temperature-dependent thermal conductivity, temperature-dependent coefficient of thermal expansion, the Boussinesq approximation for thermal bouyancy, material convection using a stress rate that is invariant to rigid rotations, an elastically deformable crust, and a free surface. The model determines the free surface velocities, solid state flow field in the mantle, and viscosity structure of lithosphere and asthenosphere. Regional topography and crustal heat flow are simulated. A suite of symmetric models, assumes continental geotherms on the right and the successively increasing rift geotherms on the left. These models predict an asthenospheric flow field which transfers cold material laterally toward the rift at $>$ 300 km, hot, buoyant material approx. 200 km wide which ascends vertically at rates of 1 km/my between 175 to 325 km, and spreads laterally away from the rift at the base of the lithosphere. Crustal spreading rates are similar to uplift rates. The lithosphere acts as stiff, elastic cap, damping upward motion through decreased velocities of 1 km/10 my and spreading uplift laterally. A parameter study varying material coefficients for the Weertman flow law suggests asthenospheric viscosities of approx. 10 exp 22 to 10 exp 23 poise. Similar studies predict crustal viscosities of approx. 10 exp 25 poise. The buoyant process of mantle flow narrows and concentrates heat transport beneath the rift, increases upward velocity, and broadly arches the lithosphere. 10 figures, 1 table. (ERA citation 05:014443)

LA-8139-MS PC **A05**/MF **A01**
Los Alamos Scientific Lab., NM.
Mineralogy and Petrology of Tuff Units from a UE25a-1 Drill Site, Yucca Mountain, Nevada.
M. L. Sykes, G. H. Heiken, and J. R. Smyth. Nov 79, 78p
Contract W-7405-ENG-36

Drill hole UE25a-1 has penetrated tuffs of Tertiary age which contain two major zeolitized horizons at depths below 380 m. These horizons are restricted to low-density, high-porosity nonwelded tuffs below the basal vitrophyre of the Topopah Springs Member of the Paintbrush Tuff (approximately 70 m above the current water table), and interfinger with more-densely-welded devitrified tuffs of granophyric mineralogy. Zeolites occur as glass pyroclast replacement, vug linings, and fracture fillings. Nonwelded units above the welded portion of the Topopah Springs Member are essentially unaltered, indicating that they have never been ground water-saturated for any significant length of time. Zeolite mineral assemblages appear to be characteristic of low temperature ($<$100 exp 0 C) ground water alteration of glass in an open hydrologic system. The principal zeolite phase is high-Si clinoptilolite with Si/Al ratios of 4.7 to 6.0. Ca tends to be the dominant large-radius cation, but grains with dominant K or Na are not uncommon, particularly with increasing depth. Compositional variations in clinoptilolite may be due to ground water composition or original pyroclast composition. Minor amounts of mordenite, characterized by lower silica content ($<$55 wt %) and high alkali content ($>$10 wt % Na sub 2 O + K sub 2 O), occur as vug fillings at depths below 500 m. Presence of mordenite may indicate slightly elevated alteration temperatures, but more likely reflects enrichment of ground water in alkalis with depth. Mineralogical, compositional, and textural similarities of the zeolitized tuffs from UE25a-1 and J-13 are compatible with a single episode of crystallization. 16 figures. (ERA citation 05:010697)

LBL-9884 PC **A02**/MF **A01**
California Univ., Berkeley. Lawrence Berkeley Lab.
Characterization of Discontinuities in the Stripa Granite.
R. K. Thorpe. Oct 79, 11p CONF-791112-27
Contract W-7405-ENG-48
Symposium on the scientific basis for nuclear waste management, Boston, MA, USA, 26 Nov 1979.

Characterization of the fracture system in a repository is important, and its purpose should dictate

the scale over which measurements must be made. The results discussed pertain to nearfield behavior of a rock mass and represent a practical limit to the degree to which discrete subsurface discontinuities can be defined by surface mapping and cross-correlation of observational borehole data. Discontinuities on the scale of the rock mass being studied can dominate its response, and should therefore be described according to their influence on the stability of the opening and local groundwater regime. Alternatively, if the size or continuity of a feature is much less than the scale of the rock mass in question, there will be insufficient data with which to validate a discrete characterization, hence a statistical approach is required. (ERA citation 05:009396)

METC/CR-80/1 PC **A02**/MF **A01**
Geological Survey, Reston, VA.
Chattanooga Shale (Devonian and Mississippian) from the Tennessee Division of Geology - US Department of Energy Cored Drill Holes Number 1 and 2, Claiborne County, Tennessee.
J. B. Roen, R. C. Milici, R. C. Kepferle, and L. G. Wallace. Jan 80, 13p
Contract AI21-79MC10866

The Chattanooga Shale of the Newman Ridge syncline lies stratigraphically above the Silurian Hancock Dolomite and below the siltstone and shale of the Mississippian Grainger Formation. Core examination indicates that the Chattanooga is predominately a black shale composed of clay, finely divided carbonaceous material, and quartz. Seventy-five % of the sequence cored is black, brownish-black, or grayish-black shale; the remaining 25 percent is made up of lighter shades of gray to greenish-gray clay shale and siltstone. Siltsize quartz is disseminated throughout the unit and also as very thin laminae. Minor to trace amounts of pyrite are common throughout the core. (ERA citation 05:013098)

N80-20964/6 PC **A03**/MF **A01**
California Inst. of Tech., Pasadena. Seismological Lab.
Hotspots and the Evolution of the Mantle.
D. L. Anderson. 1979, 33p NASA-CR-162906, CONTRIB-3432
Contract NGL-05-002-069

Trace element patterns show that continental and ocean island basalts are complementary to mid-ocean ridge basalts (MORB). The relative sizes of the two source regions can be estimated from enrichment/depletion patterns. Their combined volume, computed from estimates of whole mantle abundances, occupies the entire upper mantle. The source regions appear to be the result of an early differentiation of the mantle. The MORB source evolved from the melt fraction which lost its late stage enriched fluids to the overlying plume source. The MORB source is primarily garnet and clinopyroxene, consistent with it being an eclogite cumulate.

ONWI-21 PC **A09**/MF **A01**
Georgia inst. of Tech., Atlanta.
Geothermal Alteration of Clay Minerals and Shales: Diagenesis.
C. E. Weaver. Jul 79, 192p
Contract EY-76-C-06-1830

The objective of this report is to perform a critical review of the data on the mineral and chemical alterations that occur during diagenesis and low-grade metamorphism of shale and other clay-rich rocks - conditions similar to those expected from emplacement of heat-producing radioactive waste in a geologic repository. The conclusions drawn in this document are that the following type of alterations could occur: smectite alteration, ion mobilization, illitic shales, kaolinite reactions, chlorite reactions, organic reactions, paleotemperatures, low temperature shales, high temperature shales, and phase equilibrium changes. (ERA citation 05:014444)

ORO-5205-T5 PC **A09**/MF **A01**
Battelle Columbus Labs., OH.
Characterization and Analysis of Devonian Shales as Related to Release of Gaseous Hydrocarbons. Well N-1 Henderson County, Illinois and Well N-2 Tazewell County, Illinois.
R. S. Kalyoncu, J. P. Boyer, and M. J. Snyder. 15 Jun 79, 185p
Contract EY-76-C-05-5205

Core sampling, hydrocarbon gas contents, chemical and physical characterization data are presented. Core samples from these two Illinois basin wells were obtained in July and August 1977. Thirty-one and twenty-three samples were obtained from N-1 and N-2 wells, respectively, amounting to total core length of 940 feet. Shales from Illinois basin wells (such as N-1 and N-2) are characterized by very low hydrocarbon gas contents. In fact, the N-1 and N-2 wells exhibited the lowest hydrocarbon gas contents among all the wells thus far analyzed. The chemical analysis of these shales also indicates rather low carbon and hydrogen contents, supporting the hydrocarbon gas release data. One significant aspect of the physical characterization data is high porosity associated with low bulk densities. N-1 and N-2 shales exhibit the highest pore volume of any shales from either basin (Appliachian and Illinois). Lithology of these shales does not significantly differ from those of other locations. These shales exhibit relatively low carbonates. (ERA citation 05:008103)

ORO-5554-1 PC **A06**/MF **A01**
Texas Univ. at Austin. Bureau of Economic Geology.
Sandstone Consolidation Analysis to Delineate Areas of High-Quality Reservoirs Suitable for Production of Geopressured Geothermal Energy Along the Texas Gulf Coast.
R. G. Loucks, M. M. Dodge, and W. E. Galloway. Jan 79, 103p
Contract EG-77-S-05-5554

Analysis of reservoir quality of lower Tertiary sandstones along the Texas Gulf Coast delineates areas most favorable for geopressured geothermal exploration. Reservoir quality is determined by whole core, acoustic log, and petrographic analyses. The Wilcox Group has good reservoir potential for geopressured geothermal energy in the Middle Texas Gulf Coast and possibly in adjacent areas, but other Wilcox areas are marginal. The Vicksburg Formation in the Lower Texas Gulf Coast is not prospective. Reservoir quality in the Frio Formation increases from very poor in lowermost Texas, to marginal into the Middle Texas Gulf Coast and to good through the Upper Texas Gulf Coast. The Frio Formation in the Upper Texas Gulf Coast has the best deep-reservoir quality of any unit along the Texas Gulf Coast. (ERA citation 05:011719)

PB80-166192 Not available NTIS
Rhode Island Univ., Kingston. Graduate School of Oceanography.
Brunhes Time Scales and the Interpretation of Climatic Change,
M. A. Lominz, G. R. Heath, T.-L. Ku, and N. G. Pisias. 1979, 18p NSF/IDOE-80-4
Grants NSF-OCE75-20358, NSF-OCE77-23472
Prepared in cooperation with University of Southern California, Los Angeles. Dept. of Geological Sciences, and Oregon State Univ., Corvallis. School of Oceanography.
Pub. in Earth and Planetary Science Letters, v45 p394-410 1979.

Two new delta 18O time scales have been developed for the Brunhes Epoch using equatorial Pacific core V28-238. The first is based on a constant accumulation rate of aluminum, an assumption which has been shown to be acceptable for the last 360,000 years of the record by comparison with 230Th ages determined via the continuous strip-sample technique. Spectral and cross spectral analysis of the delta 18O records of V28-238 and a detailed composite Indian Ocean record, using the aluminum time scale as well as two earlier time scales, indicates that the Pleistocene climate has been forced by periodic fluctuations of the earth's obliquity and precession. Based on this result, the second new time scale (TWEAQ) has been derived by tuning the delta 18O record of V28-238 to the record of the earth's obliquity. Spectral analysis of the delta 18O record dated by TWEAQ indicates that 20% of the variance of the ice volume record can be ascribed to linear forcing by the earth's orbital parameters, but the trend of the data is consistent with a stochastic model.

PB80-168149 Not available NTIS
New York Univ., Tuxedo.
Direct Marine-Continental Correlation: 150,000-Year Oxygen Isotope--Pollen Record from the North Pacific,
Linda E. Heusser, and Nicholas J. Shackleton. cMay 79, 5p NSF/IDOE-80-3
Grants NSF-DEB76-12561, NSF-OCE76-22893
Prepared in cooperation with Cambridge Univ., England. Dept. of Quaternary.
Pub. in Journal of Science, v204, p837-839, 25 May 79.

Core Y72 11 1 (43 deg 15 min N, 126 deg 22 min W) contains sediment of oxygen isotope stages 1 through 6 (substages 5a through 5e are well developed) and abundant pollen from the nearby continent, enabling the authors for the first time to obtain a direct marine-continental correlation of events in the last interglacial sensu lato. From stage 6 to substage 5e the vegetational record resembles that during the waning of the glast glacial. During substage 5e, after a rapid increase of alder, western hemlock was abundant and significant amounts of redwood, oak, and Douglas fir appeared. These results suggest that vegetation on the adjacent continent during substage 5e was similar to that of the temperate conifer forests which developed in the Pacific Northwest during the Holocene. The vegetation record since that brief episode (which like the Eemian in northwest Europe lasted only a few thousand years) has been complex. (Copyright (c) 1979 by the American Association for the Advancement of Science.)

PB80-174279 PC **A08**/MF **A01**
International Council of Scientific Unions, Paris (France). Inter-Union Commission on Geodynamics.
Mid-Term Activity (1975), Report 8.
Jan 76, 158p NOAA-80031708

The Commission convened twice in Grenoble. The attendance of some 70 scientists represented Commission, Working Group members, representatives of interested Unions, and affiliated bodies. Copies of National Committees' Mid-Term Reports were distributed. This report presents the results of the Working Group Meetings, the Working Group Mid-Term Reports, Reports on Scientific Meetings and National Committee Reports. News of other organizations are also given and the appendices list the recommendations adopted by the ICG Bureau in Grenoble, the Working Group Membership, Forthcoming Meetings as well as other information.

PB80-174816 PC **A02**/MF **A01**
International Council of Scientific Unions, Paris (France). Inter-Union Commission on Geodynamics.
Bureau Meeting. Leiden, March 1971, Report No. 1.
1971, 24p NOAA-80031709

The Bureau of the ICG met at the Geological Institute of the State University of Leiden from 13th to 16th March 1971. The Secretary General's report was presented. The general directives, principles of activity, duties of the I.C.G. Working Groups and the formation of Study Groups were discussed and proposals submitted by National Committees and international bodies were considered. Ten Working Groups were proposed.

PB80-174824 PC **A06**/MF **A01**
International Council of Scientific Unions, Paris (France). Inter-Union Commission on Geodynamics.
Report of Working Group 4 Meeting: Reykjavik (July 1973), Report No. 5.
Jan 74, 122p NOAA-80031705

Following a general discussion of the aims of Working Group 4, a series of lectures was given by members and invited scientists on the geodynamics of Iceland. This was followed by reviews by each WG member, covering his particular field of competence. It was noted that the absence of many WG 4 members caused a marked imbalance in favor of continental rifts, an imbalance which the Group attempted to keep in mind during its subsequent deliberations and decisions. It was also noted that, among oceanic rifts, the mid-Atlantic rift had been the subject of some extensive recommendations in 'Understanding the mid-Atlantic Ridge' (National Academy of Sciences, Washington, DC, 1972).

PB80-174857 PC **A12**/MF **A01**
International Council of Scientific Unions, Paris (France). Inter-Union Commission on Geodynamics.
Programme Development: Recommendations and Proposals, Report No. 3.
Jun 72, 272p NOAA-80031711

This report contains information on the progress made to date in the initial, planning stage of the International Geodynamics Project. Documents related to the precursory stages rather IUGG and IUGS to request ICSU that an Inter-Union Commission be created to co-ordinate and promote a Geodynamics Project, and to the launching of the Project constitute the first part of the report. The second part gives statements provided by I.C.G. Working Groups and National Committees on proposed scientific activity within the Project. The report is intended to provide in convenient form the essential background information on the Geodynamics Project.

PB80-174865 PC **A06**/MF **A01**
International Council of Scientific Unions, Paris (France). Inter-Union Commission on Geodynamics.
Montreal Meetings, Programmes, Report No. 4.
Dec 72, 114p NOAA-80031712

The response of member countries of ICSU to the challenges of new discoveries about the earth, its history, and the development of its surface features and to the Geodynamics Project has been overwhelming. Almost 50 countries have established national committees or correspondents and are developing programs. During its annual meeting (Montreal, August 1972), the Commission discussed at some length the problems of co-ordination of efforts by National Committees working with each other as well as with Working Groups of ICG.

RHO-BWI-SA-26 PC **A02**/MF **A01**
Atomics International Div., Richland, WA. Rockwell Hanford Operations.
Basalt Stratigraphy - Pasco Basin.
A. C. Waters, C. W. Myers, D. J. Brown, and R. K. Ledgerwood. Oct 79, 11p CONF-791155-1
Contract EY-77-C-06-1030
Deccan volcanism and related basalt provinces in other parts of the world, Bombay, India, Nov 1979.

The geologic history of the Pasco Basin is sketched. Study of the stratigraphy of the area involved a number of techniques including major-element chemistry, paleomagnetic investigations, borehole logging, and other geophysical survey methods. Grande Ronde basalt accumulation in the Pasco Basin is described. An illustrative log response is shown. 1 figure. (ERA citation 05:012691)

SKBF-KBS-TR-79-02 PC **A03**/MF **A01**
Svensk Kaernbraenslefoersoerjning AB, Stockholm.
Bedrock and the Soil Types in the Finnsjoearea, Sweden.
K. -E. Almen, L. Ekman, and A. Olkiewicz. Nov 78, 46p
In Swedish.
U.S. Sales Only.

This report is a part of a long-term project, started at the request of the Nuclear Fuel Safety Project, Sweden. The aim of the project is to claryfy the geohydrological situation of a drainage area close to Finnsjoen in northern Uppland, Sweden. The work comprised bedrock- and soil mapping as well as an investigation of existing literature about the geology of northern Uppland. The area is about 25 km exp 2 and is limited by its water-shed. The area is relatively flat, rich in outcrops - expecially in the western parts - and often swampy. Big areas of forests and agriculture have been drained by ditches. (Atomindex citation 10:461933)

UCRL-15149 PC **A08**/MF **A01**
California State Univ., Hayward. Dept. of Geological Sciences.
Hydrologic Properties of Shale and Related Argillaceous Rocks.
A. N. Moiseyev. 15 Nov 79, 175p
Contract W-7405-ENG-48

This report is the result of a bibliographic study designed primarily to collect hydrologic data on American clay-rich rocks. The following information was also sought: stratigraphy, environment of deposition, mineralogic composition, and diagenetic changes. The collected numerical data are presented in tables which contain densities, porosities, and/or hydraulic conductivities of approximately 360 samples. Additional data include hydraulic diffusivities, resistivities, flow rates, and rock strengths. Geologic information suggests that large deposits of shale which may be suited for waste repository belong to all ages and were formed in both marine and continental environments. Of the studied units, the most promising are Paleozoic in the eastern half of the country, Mesozoic in the central part, and Cenozoic in the Gulf Coast area and the West. Less widespread units locally present some additional possibilities. Mineralogic investigations suggest that the smectite content in rocks shows a decrease in time (70% in Recent rocks; 35% in pre-Mesozoic rocks). Because of this predominance of smectite in younger rocks, the modeling of repositories in post-Paleozoic formations might require knowledge of additional and poorly known parameters. Results of investigations into the mathematical relationships between porosity and permeability (or hydralic conductivity) suggest that in situ permeabilities could be estimated from sonic logs and fluid pressure changes at depth. 16 figures, 8 tables. (ERA citation 05:014449)

8H. Hydrology and Limnology

AD-A082 468/0 PC **A04**/MF **A01**
Army Engineer District Philadelphia PA
Report on Survey Investigation Flood Control and Allied Purposes Along Those Streams That Flow Through Camden County, New Jersey into Delaware River.
Jun 72, 65p

The problems of water supply, water quality control, navigation, flood control and other related water and land resources along the streams that flow through Camden County, New Jersey into the Delaware River were considered during the course of the study. It has been determined that the primary need of the study area in the field of water resources is for flood control. Alternative measures, both structural and non-structural, were considered for the purposes of satisfying that need.

AD-A082 472/2 PC **A16**/MF **A01**
Geological Survey Champaign Il Water Resources Div
River Mileages and Drainage Areas for Illinois Streams. Volume 1. Illinois Except Illinois River Basin.
Water resources investigations,
R. W. Healy. Dec 79, 360p Rept nos. USGS/WRD/WRI-80/013, USGS/WRI-79-110
See also Volume 2, AD-A082 473.

River mileages are presented for points of interest on Illinois streams draining 10 square miles or more Points of interest include bridges, dams, gaging stations, county lines, hydrologic unit boundaries, and major tributaries. Drainage areas are presented for selected sites, including total drainage area for any streams during at least 100 square miles. (Author)

AD-A082 473/0 PC **A14**/MF **A01**
Geological Survey Champaign IL Water Resources Div
River Mileages and Drainage Areas for Illinois Streams. Volume 2. Illinois River Basin.
Water resources investigations,
R. W. Healy. Dec 79, 308p Rept nos. USGS/WRD/WRI-80/014, USGS/WRI-79-111
See also Volume 1, AD-A082 472

For abstract see AD-A082 472.

AD-A082 522/4 PC **A05**/MF **A01**
O'Brien and Gere Engineers Inc Syracuse NY
Recon Study Hurricane Agnes.
Contract rept.
Oct 72, 91p
Contract DACW61-73-C-0146
Original contains color plates: All DTIC and NTIS reproductions will be in black and white.

The major objective of this study was to make a preliminary overview analysis of the ecological impact of Hurricane Agnes on inland areas of short (up to 1 year), intermediate (1 to 2 years), and long term (beyond 2 years) effects. The following factors were surveyed by this study: geological characteristics, soil erosion & sedimentation, tree damage, wildlife and related habitat, fishlife, water quality, recreation areas, historical monuments, and economic impact of Hurricane Agnes upon the region. The geographical area covered by this study is bounded on the north by Syracuse, New York, on the east by Philadelphia, Pa, on the west by the Ohio-Pennsylvania State Line, and on the south by the Virginia-North Carolina border.

EGG-1183-1750 PC **A02**/MF **A01**
EG and G, Inc., San Ramon, CA. Energy Measurements Group.
Water Equivalent of Snow Survey of the Red River Basin and Heart/Cannonball River Basin, March 1978.
E. L. Feimster. Oct 79, 17p
Contract EY-76-C-08-1183

The water equivalent of accumulated snow was estimated in the Red River and Heart/Cannonball River basins and surrounding areas in North Dakota during the period 8 to 17 March 1978. A total of 570 km were flown, covering a 274 km section of the Red River Basin watershed. These lines had been surveyed in March 1974. Twelve flight lines were flown over the North Dakota side of the Red River from a point 23 km south of the Canadian border southward to the city of Fargo, North Dakota. The eight flight lines flown over the Minnesota side of the Red River extended from 23 km south of the Canadian border southward to Breckenridge, Minnesota. Using six flight lines, a total of 120 km were flown in the Heart/Cannonball River Basin, an area southwest of the city of Bismark, North Dakota. This was the first such flight in the Heart/Cannonball River Basin area. Computed weighted average water equivalents on each flight line in the Red River Basin ranged from 4.8 cm to 12.7 cm of water, averaging 7.6 cm for all lines. In the Heart/Cannonball River Basin, the weighted water equivalent ranged from 8.9 cm to 19.1 cm of water, averaging 12.7 cm for all lines. The method used employs the measurement of the natural gamma rays both before and after snow covers the ground. (ERA citation 05:012524)

PB80-164619 PC **A04**/MF **A01**
Illinois State Water Survey, Urbana.
Effect of Agriculture on Cedar Lake Water Quality.
Donald P. Roseboom, Ralph L. Evans, and Thomas E. Hill. 1979, 63p ISWS/CIR-138/79, W80-04206

This study was made to delineate the type, distribution, and magnitude of orchard-related pesticides in the aquatic environment of Cedar Lake which includes the older impoundments of Little Cedar Lake and the Alto Pass Reservoir. Cedar Lake is a source of water supply for Carbondale, Illinois. The study included analyses for mineral and pesticide content of the soils, the water and bottom muds of three lakes, and the water and sediments of the four major tributaries. In addition, the general limnology and biological characteristics of Cedar Lake were defined, sedimentation surveys of the two older lakes were performed, and relevant data regarding pesticide content in fish were evaluated. The results showed that application of pesticides in well-sodded orchards does not pose a serious threat to the water quality of Cedar Lake, but a threat does exist when such orchard lands are converted to row crops, subdivisions, or other uses that destroy the sod cover that minimizes soil erosion. Pesticide residues that make their way by soil movement to the aquatic environment do accumulate in the bottom muds of the lakes, and may become solubilized and thus transferred to the lake waters.

PB80-169378 PC **A06**/MF **A01**
Wisconsin Univ.-Superior. Center for Lake Superior Environmental Studies.
Chemical Effects of Red Clays on Western Lake Superior.
Final rept.,
Donald A. Bahnick, Thomas P. Markee, and Ronald K. Roubal. Jan 79, 119p EPA-905/9-79-003

Grant EPA-R-005169-01

The southwestern shoreline area of Lake Superior is subjected to extensive erosion of glacial-lacustrine red clay deposits. Clay bluff from the shoreline contains a large percentage of clay-size particles which remain suspended in Lake Superior for days to weeks. The clay-size particles undergo solubilization and exchange processes in the lake water. This investigation measures inputs of chemical parameters from clay particles in Lake Superior water as of a function of time. Comparisons of the chemical input magnitudes from shoreline erosion, sediment resuspension, and river particulate transport are made. Monitoring of Bayfield County, Wisconsin streams for sediment transport was done for the spring runoff period. The chemical characteristics of a near-shoreline Lake Superior site was studied as a function of water turbidity.

PB80-169410 PC **A04**/MF **A01**
Environmental Monitoring and Support Lab., Las Vegas, NV.
Distribution of Phytoplankton in Utah Lakes.
Rept. for 21 Feb-11 Dec 75,
L. R. Williams, S. C. Hern, V. W. Lambou, F. A. Morris, and M. K. Morris. Dec 79, 73p EPA-600/3-79-120
Prepared in cooperation with Nevada Univ., Las Vegas. Dept. of Biological Sciences.

This is a data report presenting the species and abundance of phytoplankton in the 25 lakes sampled by the National Eutrophication Survey in the State of Utah. Results from the calculation of several water quality indices are also included (Nygaard's Trophic State Index, Palmer's Organic Pollution Index, and species diversity and abundance indices).

PB80-170939 PC **A07**/MF **A01**
Ohio State Univ. Research Foundation, Columbus.
Maumee River Basin Pilot Watershed Study. Volume I. Watershed Characteristics and Pollutant Loadings, Defiance Area, Ohio.
Final rept. May 75-May 77,
Terry J. Logan, and Robert C. Stiefel. Mar 79, 149p EPA-905/9-79-005-A
Grants EPA-R-005145-01, EPA-R-005336-01
See also Volume 2, PB80-170947.

Five small agricultural watersheds and eight plots in the Maumee River Basin of Ohio were instrumented for measurement of sediment and nutrients leaving the land under prevailing land use management. These results were compared with loadings from larger watersheds in the Basin and with downstream tributary loads. Studies were also conducted on sediment transport, adsorption-desorption of sediment-P, and heavy metal and pesticide loss from the Basin. Monitoring during 1975-1977 showed that there were significant differences in sediment and nutrient losses among different soil types in the Basin. Greatest sediment losses occurred on the level and very poorly drained, high-clay lake plain soils as well as the sloping, dissected lake plain clay soils.

PB80-170947 PC **A07**/MF **A01**
Ohio State Univ. Research Foundation, Columbus.
The Maumee River Basin Pilot Watershed Study. Volume II. Sediment, Phosphates, and Heavy Metal Transport, Defiance Area, Ohio.
Final rept. May 75-May 77,
Terry J. Logan. Mar 79, 146p EPA-905/9-79-005-B
Grant EPA-R-005145-01
See also Volume 1, PB80-170939.

Losses of nutrients and sediments from agricultural land were monitored during 1975-1977 in the Maumee River Basin, Ohio. Special studies were made on sediment mineralogy and chemistry and on sediment, pesticide, and metal sediment transport. Suspended sediments were higher in total-P (phosphorus) and labile-P than soils or stream-bottom sediments. Sediments are enriched in P during erosion and transport because of preferential transport of clay which is higher total P than the whole soil. Preferential clay transport changed sediment mineralogy from its original soil mineralogy. Heavy metal concentrations were low and indicated that groundwater and eroded soil were the major source.

PB80-170996 PC **A23**/MF **A01**
Bureau of Reclamation, Washington, DC.
Guide for Hydrogeologists. Volume II,
V. M. Maksimov. c1979, 549p TT-70-57766
Contract NSF-C466
Trans. of mono. Spravochnoe Rukovodstvo Gidrogeologa. Tom II, Leningrad, 1967. Sponsored in part by National Science Foundation, Washington, DC. Special Foreign Currency Science Information Program.

Partial contents:
- Hydrogeological survey;
- Method of describing the water points and hydrogeological observations in the boreholes, profiles, wells and underground structures;
- Laboratory methods and empirical formulas for determining the filtration coefficient of rocks;
- A short description of the hydrogeochemical methods of prospecting of minerals;
- Methods of hydrogeological studies for water supply, explorations and prospecting of oil and gas, disposal of industrial waste waters in deep horizons and hydrotechnical structure;
- Drilling equipments, pumps and motors for drilling the hydrogeological boreholes.

PB80-176324 PC **A02**/MF **A01**
Meta Systems, Inc., Cambridge, MA.
Assessment of National Small Rural Watersheds Program. Executive Summary.
Final rept.,
M. B. Fiering, R. E. Sharpin, and G. K. Young. Jun 77, 22p FHWA/RD-77-23
Contract DOT-FH-8605

A State-by-State assessment is made of the current status of the National Small Rural Watersheds Program with regard to adequacy of data collection and analysis. Methodology is recommended for flood frequency estimation to replace currently used biased approaches. Concepts of risk aversion are discussed, and decision criteria based on economic considerations are incorporated into the hydrologic evaluation. Stream gaging programs of various gaging densities for 48 States are evaluated and recommendations made for continuation or termination of the programs based on FHWA objectives of drainage culvert design.

RHO-BWI-C-47 PC **A10**/MF **A01**
Summers (W.K.) and Associates, Inc., Socorro, NM.
Spring Inventory of the Rattlesnake Hills.
G. E. Schwab, R. M. Colpitts, Jr., and D. A. Schwab. May 79, 207p
Contract EY-77-C-06-1030

Springs and reported spring locations within about 182 square miles of the Rattlesnake Hills in Benton and Yakima Counties, Washington, were studied for this report. One hundred twenty-five discrete locations were visited. Water was tested at 74 locations. Of the remainder, 35 were dry, 7 were iced over, and 7 were damp (too little water to sample). Two cisterns were not sampled. Eighty-three water samples from 73 springs and 1 cistern were analyzed in the field. Temperature, specific conductance, and pH were measured at each sample site. Water from each of these sources was titrated to determine carbonate, bicarbonate, and carbon dioxide contents. Seventy-one sketch maps show sample sites plus 9 other locations. Profile sections accompany the sketches where such views are informative. Altitudes of visited locations range from 700 feet to 3360 feet. Altitudes of sampled springs range from 1150 feet to 3275 feet. Discharge rates within the study area range from seeps estimated at less than one-quarter gallon per minute to a multiple-spring stream measured at about 70 gallons per minute. (ERA citation 05:013168)

SAN-1747-T3 PC **A04**/MF **A01**
VTN Consolidated, Inc., Irvine, CA.
BX In Situ Oil Shale Project. Special Technical Report: Surface Water Hydrology of the Piceance Creek Basin and BX IN Situ Oil Shale Project, Rio Blanco Country, Colorado.
P. M. Dougan. 1 Nov 79, 75p
Contract ET-78-F-03-1747

Objective is to demonstrate the technical feasibility of using superheated steam as a heat-carrying medium to retort in situ the oil shale in the Green River Formation leached zone and provide a mechanism for the recovery of this shale oil with a minimum impact on the environment. One trillion Btu of heat will be injected into a site over two years to retort a shale zone about 550 feet thick and covering about one acre. This document covers studies of basic surface water hydrology conditions. (ERA citation 05:013106)

8I. Mining Engineering

APL/JHU/QM-79-163/GT PC **A03**/MF **A01**
Johns Hopkins Univ., Laurel, MD. Applied Physics Lab.
Evaluation of Potential Geothermal Resource Areas.
F. O. Mitchell. Jul 79, 50p
Contract EX-76-A-36-1008

A method for the comparative evaluation of geothermal prospects in the Eastern United States is proposed and illustrated. Comparisons are based on quantified data from geologic, engineering, and socio-economic sources including temperature gradient, depth to basement, drilling costs, population, and distribution by town size, as well as energy use in residential, commercial, and industrial applications. (ERA citation 05:011707)

BETC/W-26-8 PC **A03**/MF **A01**
Oak Ridge National Lab., TN.
Chemicals for Enhanced Oil Recovery. Quarterly Report, April 1, 1979-June 30, 1979.
A. L. Compere, J. M. Crenshaw, and C. M. Fowler. Feb 80, 38p
Contract W-7405-ENG-26

Sodium-2-ethyloleate of higher purity has been prepared. The shift in alkane number of lowest interfacial tension with increasing surfactant concentration is no longer seen. Interfacial tensions in the millidyne/cm range are still observed, but the minimum for top vs bottom phases appears to be slightly above nonane for both 0.01 M and 0.05 M surfactant, 0.5 M NaCl and 5% ibutyl alcohol, pH 9.8, (the initial aqueous phase). Previously, the minima appeard to be about undecane for 0.01 M surfactant and about octane for 0.05 M. In direct sulfonation of oleamide with SO sub 3 -tributylphosphate complex, an unsaturated sulfonated amide was obtained in yield greater than 90%. Addition of ethoxylated tall oils to petroleum sulfonates broadened the region of three phase behavior. No ultralow interfacial tensions have yet been observed with these mixtures, however. Further studies on the effect of bleach plant effluent from the draft process for pulping of wood in reducing the adsorption of petroleum sulfonates on montmorillonite and on Berea sandstone have clarified some earlier results. Displacment of previously adsorbed surfactant from clay be contact with solutions containing bleach plant effluent was confirmed. Batch bench scale tests of Sporotrichum dimorphosporum QM 806 exolaminarinase showed an improvement in the stability of enzyme activity on scleroglucan in the presence of 10 mM added magnesium. Activity variation with pH was different for scleroglucan and laminarin substrates, with activity maxima at pH3 and 5, respectively. Temperature maxima were above 70 C in both cases. (ERA citation 05:013054)

BETC-5075-2 PC **A03**/MF **A01**
Houston Univ., TX.
Basic Studies in the Displacement of Residual Oil by Chemical Flooding. Annual Report, February 1, 1978-January 31, 1979.
R. W. Flumerfelt, A. C. Payatakes, and M. K. Tham. Feb 80, 37p
Contract EY-76-S-05-5075

Research studies at the University of Houston are concerned with (1) the role of dynamic interfacial properties on the displacement and reconnection processes occurring in surfactant flooding processes and (2) the analytical description of multiphase displacement dynamics using ganglia population balance models and simulation algorithms. Tests on oil-water-surfactant systems using both a drop deformation and orientation method and the viscous traction method indicate the largest interfacial viscosities at salt concentrations in the

neighborhood of the optimal salinity. Values of interfacial viscosities for crude oil systems were considerably larger than those associated with isooctane systems. A new technique involving the use of a spinning drop apparatus has been developed for controlled coalescence tests. Tests to date on several iso-octane-brine-surfactant systems and one crude oil-brine-surfactant system indicate that the fastest coalescence occurs at salt concentrations near the point of optimal salinity. Also, the crude oil systems coalesce at significantly slower rates than the iso-octane systems. Capillary displacement tests involving iso-octane drops being displaced by water have been attempted in both constant pressure drop and constant displacement rate systems. Work has continued in the development of a theoretical description of the dynamics of mobilized oil ganglia, their breakup, coalescence, and entrapment. Improvements in the mobilization criteria have been effected, and hundreds of computer-aided stochastic realizations have been performed for solitary ganglia of all sizes of interest moving in a 100 x 200 sandpack. These realizations show clearly that a solitary ganglion gets slenderized as it moves, and that either it gets restranded whole after a few rheons, or that it first breaks into two daughter ganglia, which eventually get stranded. (ERA citation 05:013053)

BETC-79/4 PC **A07**/MF **A01**
Department of Energy, Bartlesville, OK. Bartlesville Energy Technology Center.
Contracts and Grants for Cooperative Research on Enhanced Oil Recovery and Improved Drilling Technology. Progress Review No. 20, Quarter Ending September 30, 1979.
B. Linville. Jan 80, 137p

The contracts and grants for field projects and supporting research on enhanced oil recovery and improved drilling technology are arranged according to: chemical flooding; carbon dioxide injection; thermal/heavy oil; resource assessment technology; improved drilling technology; residual oil; environmental; and petroleum techology. (ERA citation 05:013052)

BNL-51048 PC **A07**/MF **A01**
Brookhaven National Lab., Upton, NY.
Cementing of Geothermal Wells. Progress Report No. 12, January-March, 1979.
Aug 79, 142p
Contract EY-76-C-02-0016

Work to implement the program plan for the development of improved high temperature cementing materials for geothermal wells is continuing. Results from initial tests in the Dynamic Brine Exposure Testing Apparatus (D-BETA) are available. Based upon initial data, the rate at which cement coupons undergo change in the D-BETA is between that of the static tests and the dynamic exposures at East Mesa. Several cementing compositions have been formulated with chemical, physical and mechanical properties to withstand the existing geothermal conditions. The pumpability of three formulations has been demonstrated and the materials have been submitted to NBS for additional evaluation. The effect of Al sub 2 O sub 3 , Fe sub 2 O sub 3 , SO sub 3 , Na sub 2 CO sub 3 and Na sub 2 SO sub 4 on different binders were studied at Colorado School of Mines. The results were found to range from deleterious to beneficial. Phosphate-bonded cements have been produced at the University of Rhode Island from a glass containing 7% Na sub 2 O, 24% CaO, 24% Al sub 2 O sub 3 and 45% SiO sub 2 . Preliminary tests indicate that the material sets in several hours and appears to have some high temperature stability. Tests performed on hydrothermal cements indicate six formulations that are pumpable as long as three hours at 316 exp 0 C. Two formulations, Al sub 2 O sub 3 and ZrO sub 2 , have been chosen for use at temperatures above 300 exp 0 C. Polymer concentrates containing cement fillers have been found to be hydrothermally stable in 300 exp 0 C brine. Recommended standards for evaluating geothermal well cements have been developed by NBS. (ERA citation 05:013423)

COO-2817-T1 PC **A09**/MF **A01**
Sperry Research Center, Sudbury, MA.
Geothermal down-Well Instrumentation (During Drilling). Final Report.
W. H. Kent, P. G. Mitchell, and R. V. Row. Jun 79, 188p
Contract EY-76-C-02-2817

The object of the work was to investigate acoustic and electromagnetic telemetry methods which could be used as a basis for geothermal MWD systems. The emphasis has been on methods which employ the drill string and/or the formation surrounding the borehole as a signalling media. The investigations have been confined to the transmission characteristics of these media and have excluded the area of downwell measurements. Work performed includes: laboratory measurement of acoustic attenuation in drill pipe; field measurement of acoustic attenuation in drill pipe; measurements of drill string vibrations (drilling noise) during drilling; evaluation of drill string vibration dampers; modeling of electromagnetic propagation in the borehole region; and field measurements of attenuation of a downwell electromagnetic signal source. (ERA citation 05:013425)

COO-4896-T1 PC **A02**/MF **A01**
Massachusetts Inst. of Tech., Cambridge.
Process Applications for Geothermal Energy Resources. Progress Report.
1 Oct 79, 9p
Contract ET-78-S-02-4896

Energy use characteristics of the major energy using industries in the US were examined. The pulp and paper industry was selected and a workshop held. Two analyses were performed of the potential for substituting geothermal energy for fossil fuel in specific pulp and paper plants. The lack of industry interest is discussed. (ERA citation 05:011790)

DOE/BC/10003-1 PC **A05**/MF **A01**
CER Corp., Las Vegas, NV.
Western Gas Sands Project. Status Report, 1 October 1979-31 October 1979.
1979, 93p
Contract AC08-79BC10003

This report summarizes progress of government-sponsored projects directed toward increasing gas production from the low-permeability gas sands of the western United States. The USGS in Denver continued work toward resource assessment in the four primary study areas. Preparations continue for the coring of the Pacific Transmission Supply Company No. 3-10A Federal well in Sweetwater County, Wyoming, and coring and logging operations were completed at PTS No. 22-12 Federal well, Rio Blanco County, Colorado. Work on fracture conductivity, rock-fluid interaction and log evaluation and interpretation techniques continued at Bartlesville. The Gas Research Institute suspended work on the Rio Blanco 397-19-1 Government well but continued progress on two other projects. Lawrence Livermore Laboratory continued work on hydraulic fracturing mechanics. Los Alamos Scientific Laboratory continued NMR resonance studies. Analyses of the borehole seismic system and the borehole hydrophone system continued at Sandia Laboratories, as well as electromagnetic logging experimentation. Field tests and demonstrations are reported on. (ERA citation 05:013091)

DOE/BC/10082-2 PC **A11**/MF **A01**
Columbia Univ., New York. School of Engineering and Applied Science.
Adsorption from Flooding Solutions in Porous Media: A Study of Interactions of Surfactants and Polymers with Reservoir Minerals. Annual Report.
P. Somasundaran. Feb 80, 245p
Contract AC19-79BC10082

Work is reported on three topics: adsorption of surfactants on reservoir minerals, solution chemistry of surfactants, and dynamic studies of the interaction of polymer and surfactant with core minerals. (ERA citation 05:013055)

DOE/EDP-0048 PC **A05**/MF **A01**
Department of Energy, Washington, DC. Assistant Secretary for Fossil Energy.
Environmental Development Plan Enhanced Oil Recovery.
Nov 79, 80p

The Division of Fossil Fuel Extraction, within the Office of Energy Technology, is responsible for DOE's Enhanced Oil Recovery (EOR) research, development, and demonstration program. The EOR program activities are designed to accelerate the development of environmentally acceptable technologies for the tertiary recovery of oil from economically depleted and heavy oil reservoirs. The major project areas identified for the EOR Program are thermal processes (steam injection and in situ combustion), miscible processes (carbon dioxide injection), and chemical flooding processes (micellar-polymer flooding and improved waterflooding). In order to promote the prompt commercial application of the developed technology, DOE has recently established a commercialization task force to study the technology and its potential application and to develop initiatives that can be undertaken by the Federal Government to accelerate the commercial application of this technology. This effort is being carried out by the Office of Oil and Gas in the Division of Resource Applications. Details of this program are described in detail in Chapter III of this document. The major environmental concerns affecting the EOR technology program include air quality degradation, aquifer contamination, water availability, and occupational health and safety considerations. The major concerns and the environmental, health, and safety (EH and S) research requirements are summarized. (ERA citation 05:011205)

DOE/EIA-0096 PC **A05**/MF **A01**
Department of Energy, Dallas, TX. Energy Information Administration.
Cost and Indexes for Oilfield Equipment and Production Operations in the United States.
Oct 78, 81p

Oilfield equipment and/or operating costs for 1976 and 1977 on a hypothetical lease basis for selected depths in seven producing areas of the United States are presented. Indexes are included that measure change in industry costs for the period 1970 through 1977. These indexes measure the relative changes occurring in the costs of lease equipment and operating expenditures compared with the base year 1976. This study also provides the format for a systematic and consistent series of oilfield equipment and operating cost indexes, which may be published annually. Summary tables have been assimilated in the test and detailed tables of the costs and indexes for each category of equipment and operations utilized in the production of oil are presented in the appendixes. Onshore equipment costs increased from 91 to 170 percent depending upon area, depth, and type of lift during the period 1970 through 1977. Onshore annual operating costs increased from 97 to 155 percent during the period dependent upon area and type of operation considered and offshore operating costs increased about 105 percent. (ERA citation 05:011227)

DOE/ET/10023-T1 PC **A03**/MF **A01**
Kaiser Engineers, Oakland, CA.
Development of Optimal Terrace Pit Coal Mining Systems. Technical Progress Report, October 1- October 31, 1979.
19 Nov 79, 36p
Contract AC01-79ET10023

A bibliography on various aspects of optimal terrace pit coal mining systems is included. Relevant federal and state legislation and regulations have been identified. Mines of interest to the project have been identified and listed for field visits. Seven regions of different climates, hydrology, geology, etc., are being studied individually. (ERA citation 05:011140)

DOE/ET/15391-T2 PC **A03**/MF **A01**
Westinghouse Electric Corp., Boulder, CO.
Fracture Characterization Study.
R. F. Kehrman. Apr 78, 28p
Contract AC04-76ET15391

First, the origin, nature, and significance of fractures in general are discussed. Next, discussions are directed toward the designation and classification of fractures. Some typical fracture measurement techniques are discussed. Finally, geothermal fracture systems are investigated and correlations made to determine which fracture technologies from oil field work are applicable to geothermal systems. (ERA citation 05:011735)

DOE/ET/28301-1 PC **A05**/MF **A01**
Terra Tek, Inc., Salt Lake City, UT.
Capabilities to Measure Geothermal Material Properties at Simulated In Situ Conditions. Final Report.
D. O. Enniss, S. W. Butters, R. Lingle, R. G. Van Buskirk, and F. R. Prater. Jul 79, 82p
Contract EG-77-C-07-1650

The lack of reservoir material property data has been identified as a major obstacle to geothermal development and commercialization. To meet this need a high pressure/high temperature test facility was designed and constructed at Terra Tek under Department of Energy funding. Testing capabilities include confining and pore fluid pressure to 200 MPa and temperatures to 535 exp 0 C. Rock samples to 10.2 cm diameter can be accommodated. The program summarized herein is the second year (October 1977-September 1978) effort. Test techniques were developed to meet the geothermal community needs and tests were conducted to determine: mechanical properties, thermal conductivity, thermal diffusivity, thermal expansion, permeability, electrical resistivity and ultrasonic velocities. Sandstones, graywackes, granites, and basalts, from KGRA's in Baca, New Mexico; Milford, Utah; Geysers, California and Northern Nevada, respectively were characterized. (ERA citation 05:013431)

DOE/ET/28373-1(Pt.2) PC **A08**/MF **A01**
Gruy Federal, Inc., Houston, TX.
Atlantic Coastal Plain Geothermal Drilling Program: DOE/Crisfield Airport No. 1 Well, Somerset County, Maryland. Part II. Well Test Analysis. Final Report.
J. H. Hartsock, R. L. McCoy, and L. Radford. Jan 80, 168p
Contract ET-78-C-08-1558

Crisfield Airport No. 1 well was drilled and completed as the first deep test of the Atlantic Coastal Plains Geothermal Program. The well penetrated several thick, unconsolidated sands, three of which were selected for short-term testing. Bottomhole pressures during pumping and recovery were measured using a surface-recording quartz crystal gauge accurate to 0.01 psi. At the surface a data collection station was assembled to measure the flowing temperature, detect sand production, monitor scale deposition, and sample the effluent. The results of these tests are shown. The maximum surface temperature recorded during pumping operations was 127 exp 0 F (52.8 exp 0 C). Chemical analysis of the water samples from the zones showed total dissolved solids of approximately 71,500 parts per million. (ERA citation 05:011786)

DOE/ET/28464-1(V.1) PC **A03**/MF **A01**
RPC, Inc., Austin, TX.
Legal Issues Related to Geopressured-Geothermal Resource Development. Geopressured-Geothermal Technical Paper No. 1.
Jul 79, 49p
Contract ET-78-G-05-5958

The legal aspects of geopressured-geothermal development in Texas are discussed. Many of the legal issues associated with geopressured-geothermal development in Texas are unsettled and represent areas of developing policy and law. Lawsuits can be expected either before or shortly after the first commercial development of geopressured-geothermal resources. (ERA citation 05:013407)

DOE/ET/28464-1(V.3) PC **A04**/MF **A01**
RPC, Inc., Austin, TX.
Geopressured-Geothermal Energy Development: Social and Economic Issues. Geopressured-Geothermal Technical Paper No. 3.
Jul 79, 53p
Contract ET-78-G-05-5958

Information is presented relevant to rule-making for geopressured-geothermal development on state-owned lands. The analysis is focused on those potential social and economic effects of resource development, if any, which may require special attention during the leasing and permitting process. The social and economic impacts likely to result from resource development depend upon characteristics specific to the site and surrounding social and economic systems. (ERA citation 05:013408)

DOE/MC/10516-T3 PC **A02**/MF **A01**
Geological Survey, Reston, VA.
Shale Characterization and Resource Appraisal of the Devonian Black Shales of the Appalachian Basin. Quarterly Report, October-December 1979.
W. de Witt, Jr. 1979, 13p
Contract AI21-79MC10516

Milestones in December are reported for the stratigraphy, geophysics, geochemistry, mineralogy, structure, and resource appraisal of the brown-to-black potentially gas-productive shales in the Appalachian basin. (ERA citation 05:013079)

DOE/PE-4973 PC **A07**/MF **A01**
Rensselaer Polytechnic Inst., Troy, NY.
Energy Supply Strategy: Getting Technology Commercialized, Shale Oil and Enhanced Oil Recovery.
J. E. Steger, P. Sullo, M. Michaelis, and H. K. Nason. Dec 79, 140p
Contract EJ-78-S-02-4973

Purpose is to identify factors inhibiting the near-term investment of industrial funds for producing oil from shale and through enhanced oil recovery, and to estimate the investment and production which would result if these deterrents were removed and suitable incentives provided. The barriers are discussed under the following categories: economic, environmental, institutional/regulatory, and technical. (ERA citation 05:011207)

DOE/RA-0043-D PC **A05**/MF **A01**
Department of Energy, Washington, DC.
Geothermal Progress Monitor. Progress Report No. 1.
Dec 79, 84p

Progress is reported on the following: electrical uses, direct-heat uses, drilling activities, leases, geothermal loan guarantee program, general activities, and legal, institutional, and regulatory activites. (ERA citation 05:013388)

DOE/RA-0044 PC **A08**/MF **A01**
Department of Energy, Washington, DC. Office of Leasing Policy Development.
Analysis of Exploration, Development and Production Activity on Federal Outer Continental Shelf Leases.
J. A. Gribbin, G. M. Kaitz, S. W. Edwards, and K. W. Erickson. Dec 79, 152p

The recently passed Outer Contir.ental Shelf Lands Act Amendments of 1978 reconfirmed Congress' desire to ensure that persons holding Federal Outer Continental Shelf (OCS) leases act in a diligent manner to explore and develop the resources on these leases. Since the Secretary of Energy is responsible for issuing regulations that establish diligence requirements for operations on Federal leases, the Leasing Policy Development Office (LPDO) examined the actual history of operations on all Federal OCS leases. This report presents the findings of that examination. The primary objective of the analysis was to determine and to describe the actual record of exploration, development, and production activity on Federal OCS leases. The analysis was designed also to identify factors that influence the rate of this activity. (ERA citation 05:009632)

DOE/TIC-11062 PC **A05**/MF **A01**
Tulsa Univ., OK. Geophysics Lab.
Geothermal Ground Noise Measurements at Roosevelt Hot Springs and Cove Fort, Utah. Final Report.
S. J. Laster, and E. J. Douze. Sep 78, 94p

The present study was basically aimed at determining the type of noise found around a geothermal reservoir. Six element arrays were used to determine the structure of the noise field and the types of waves present. Arrays were used at both the Roosevelt Hot Springs and Cove Fort areas. The arrays consisted of six seismometers, one in the center and the others evenly spaced on a circle. The interelement array spacing varied from 50 m to 300 m depending on the experiment. The instrumentation and the arrays are discussed in some detail. The theory required to gain an understanding of the results is briefly discussed. (ERA citation 05:013399)

DOE/TIC-11072 PC **A02**/MF **A01**
Bendix Field Engineering Corp., Grand Junction, CO.
Preliminary MAP No. 28: Mine Location MAP and Ore Production Data, Lukachukai Mountains, Apache County, Arizona.
E. A. Learned. Jan 79, 16p
Contract EY-76-C-13-1664

A mine location map and ore production data (uranium/vanadium) for Lukachukai Mountains, Apache County, Arizona, are presented. (ERA citation 05:011302)

DOE-27056-2 PC **A04**/MF **A01**
Utah Roses, Inc., Sandy.
Floral Greenhouse Heating. Semi-Annual Technical Report.
J. F. Kunze, and R. C. Stoker. Oct 79, 57p DOE/ET/27056-T1
Contract EY-76-C-07-1570

A demonstration project for providing floral greenhouse space/process heat for a 6-acre greenhouse facility in metropolitan Salt Lake City has been jointly undertaken by the greenhouse owner (Utah Roses, Inc.) and the US Department of Energy. The work on the environmental evaluation was completed in March 1979, and the contract between the two principal organizations to proceed with the project was signed on May 1. Drilling of the first well is scheduled to commence by late October, with a target drilling depth of 3,000 to 4,000 feet. There are several shallow warm wells in the area, the closest being 100 yds from Utah Roses, and having 94 exp 0 F temperatures at 750-foot depth. A minimum target temperature of 120 exp 0 F has been set for the exploratory production well, which is to be drilled beginning in late October 1979. (ERA citation 05:011791)

EPRI-FP-989(V.5) PC **A05**/MF **A01**
Science Applications, Inc., Palo Alto, CA.
Nuclear Assay of Coal. Volume 5. Coal Btu Measurement Study: Monitoring of Moisture in Coal. Final Report.
D. R. Brown. Sep 79, 79p

Two electromagnetic techniques, capacitance response and microwave absorption, have been investigated for on-line moisture monitoring of coal. The response of instruments based on these techniques was measured using a representative range of US coal types ad moisture levels. Uncertainties in moisture determinatio of less than 5% were obtained with both techniques. However, a microwave interrogation is judged best for on-line application because it is both accurate and nonobtrusive. In on-line applications, this level of accuracy in moisture determination, combined with reasonable accuracies in determination of the elemental content, will allow the Btu value of the coal to be deduced to accuracies of 2% or better. (ERA citation 05:012986)

FE-MIT-2295T26-9 PC **A02**/MF **A01**
Massachusetts Inst. of Tech., Cambridge. Energy Lab.
Critical Studies of the Rapid Pyrolysis and Hydropyrolysis of Coal. Quarterly Progress Report, February 10, 1979-June 30, 1979.
J. B. Howard, P. C. Bigot, T. W. Bush, R. Caron, and R. Casaprima. 1979, 5p
Contract EX-76-A-01-2295-026

Preparation of coal samples pretreated with minerals was completed in this period. Samples of demineralized coal were impregnated with CaO from solution, or co-slurried with suspensions of quartz, pyrite, kaolinite, shale, montmorillonite, or acid-treated montmorillonite. These, along with the calcite and FeSO sub 4 pretreated coals prepared earlier form the complete suite of treated samples of the Pittsburgh Seam bituminous coal to be investigated in this program. The remainder of the reporting period was spent obtaining pyrolysis data. Runs were performed on demineralized bituminous coals under 1000 psi H sub 2 which, on

completion, will give base case curves similar to those previously obtained under 1 atm He. Pyrolysis of the calcite and CaO pretreated samples was carried out at 1 atm He, under the test conditions of 700 exp 0 C zero holding time, and 1000 exp 0 C, 5 second holding time. While complete calculations have not yet been completed, a definite mineral matter effect was noted in both cases. Tar production was suppressed, light gas yield and ethylene/ethane ratio increased slightly, and there was a multi-fold increase in production of carbon oxides, CO sub 2 at lower temperatures, shifting to CO at higher temperatures. This effect was more pronounced with the CaCO sub 3 sample than with the CaO sample, the excess carbon oxides in the former case probably originating from calcite decomposition. These results have interesting implications for the modelling of coal pyrolysis, and further study of these minerals will probably be undertaken after test case analysis of the remaining mineral treated samples is completed. (ERA citation 05:012983)

FE-1231-15 PC **A04**/MF **A01**
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Mining and Minerals Engineering.
Design Optimization in Underground Coal Systems. Sections 1-4. Interim Report, October-December 1978.
C. Haycocks. Mar 79, 68p
Contract EX-76-C-01-1231

Work on the structural properties of coal and rocks was confined to preparation of the final report Structural Characteristics of Coal. Continued effort was made to upgrade and improve the longwall simulation. As part of the effort, a fresh look is being taken at the method of calculating support loads and in particular the method of determining whether a roof will form a cantilever behind the chock line. The system, based purely on strata strength, density, modulus, and thickness consideration, appears limited in scope as it ignores the rock mass properties. Therefore, a rock mass classification method of characterizing the roof strata is being investigated. In particular this would allow evaluation of the joint systems in addition to other structural properties and should provide a more realistic determination of support load. The major problem with the approach is seen to be the difficulty in obtaining adequate rock mass data from exploration boreholes. This problem is also to be investigated particularly in the light of new down-the-hole geothermal investigation devices. Work continued on the final report of the roof truss portion of the work. The report includes the theory, modeling method, experimental and field data, and the analysis and correlation of the above, in addition to recommendations concerning efficient installation and usage of roof trusses. (ERA citation 05:011142)

FE-2722-6 PC **A03**/MF **A01**
West Virginia Univ., Morgantown. Coll. of Mineral and Energy Resources.
Effects of Minerals on Coal Beneficiation Processes. Quarterly Report No. 6, January 1-March 31, 1979.
B. G. McMillan, R. B. Muter, W. H. Buttermore, W. C. Grady, and J. K. Alderman. 15 Jun 79, 46p
Contract EF-77-S-01-2722

Samples of feed coal, clean coal product, and refuse from three commercial coal preparation plants have been processed to yield samples for chemical and mineralogical analysis, physically characterized using screens and float-sink gravity separations, and submitted for extensive chemical analyses. Data collected from this work is being reported as it is available. This report presents a variety of data collected during characterization of the Pocahontas No. 3 sample (southern West Virginia) collected at the District Seven Preparation plant. Calcomp plots of washability data, the screen analysis of the raw coal, a large part of the chemical data obtained from the screen and gravity fractions, and the washability analysis itself are presented. Further characterization of the Pittsburgh sample included correlations between maceral groups, macerals, and mineral matter in head and float-sink fractions. Qualitative mineral distribution trends were also identified for head samples from the Pittsburgh and Pocahontas No. 3 seams using IR. Additional work performed on equipment in the pilot-scale preparation plant to optimize jigging capability is discussed. (ERA citation 05:013022)

FE-3271-T1 PC **A05**/MF **A01**
Occidental Research Corp., Irvine, CA.
Consolidation of Bad Top at the Virginia Pocahontas Division of Island Creek Coal Company.
H. von Schonfeldt, and R. Pothini. 1 Mar 79, 87p
Contract ET-78-C-01-3271

A test was conducted to stabilize broken roof rock (bad top) in the Beatrice Mine of the Beatrice Pocahontas Company. The technique was originally developed in Europe and is based on injecting polyurethane into the friable roof strata through a pre-determined number of drill holes. Upon curing, the polyurethane re-cements the rock fragments into place and forms a consolidated mine roof. The tests were carried out in the headgate entry of a longwall system. The objective of this work was to demonstrate that polyurethane could be successfully used to prevent roof falls in an area that would otherwise be difficult to support and thereby provide a cost effective means of maintaining an essentially uninterrupted longwall operation. A total of 10.7 tons of polyurethane was forced into the rock through 60 boreholes drilled into the roof. The test was completed approximately 3 months before the mining front passed through the consolidated area. Continued monitoring of the roof in the test area indicated that the roof had been sufficiently stabilized and that no significant roof falls were eminent. When the mining front moved through the test area, no slowdown of the longwall productivity was experienced. The longwall productivity in the 200 foot long test area actually increased approximately 35% over the average productivity prior to reaching the test area. The demonstration test therefore was regarded successful in preventing a major roof fall in a highly unstable area and in maintaining average or better longwall mining productivity. It was found that chemical consolidation is particularly well suited for applications around longwall systems because the method has the potential of maintaining high longwall production even under difficult ground conditions. (ERA citation 05:011143)

FE-8385-T1 PC **A03**/MF **A01**
Columbia Gas System Service Corp., Columbus, OH.
Columbia-DOE 10-Well Project. Technical Progress Report, January 1980.
Jan 80, 43p
Contract EW-78-C-21-8385

September 1979 marked the initiation of field work on this program. By the end of November, Columbia had drilled/cored, logged and cased all ten project wells. The wellsite locations are in Lorain and Trumbull Counties in Ohio. Significant gas shows occurred in wells Nos. 20150 and 20152 in Lorain County, and well No. 20144 in Trumbull County. Important drilling and logging information is presented, together with hole sizes, casing and cementing programs for each well. (ERA citation 05:013092)

FE-8917-2 PC **A07**/MF **A01**
Barnes and Reinecke, Inc., Elk Grove Village, IL.
Steam Engine Analysis. Final Technical Report.
W. G. Allbach, M. J. Smith, and R. F. Wenshutonis. Jun 79, 140p
Contract ET-77-C-01-8917

The objectives of this contract were the familiarization, cost analysis, and thermodynamic analysis of a prototype Rankine cycle steam engine. This steam engine is intended for application in an underground vehicle. The cost analysis was made, by direction, for the material and direct labor based on a single prototype steam engine extended to lots of 100 units and 500 units annually. Support data for this cost analysis are contained herein. The conclusions derived from the familiarization and the cost analysis are that the cost is higher than alternate vehicle power systems, (i.e., batteries, diesel, cable reel, etc.), the design and configuration is not in a state of reproducibility and maintainability, and needs to be reconfigured for cost reduction. The thermodynamic analysis of the effect of the steam power plant upon the mine environment was based on previously reported data and the characteristics of this single prototype steam engine (PSE) operating in a laboratory environment on a fixed dynamometer. The analysis indicates that the steady state temperature in the mine entry air downstream of the steam powered vehicle would increase significantly while the steam engine is operating, unless the ventilation air flowrate is increased above the minimum 9000 CFM requirement. (ERA citation 05:011144)

FE-8972-1 PC **A16**/MF **A01**
Cooperative Inst. for Research in Environmental Science, Boulder, CO.
Analytical Bases for Electromagnetic Sensing of Coal Properties.
J. R. Wait, D. C. Chang, R. J. Lytle, M. A. Ralston, and K. R. Umashankar. Jul 78, 356p
Contract ET-75-G-01-8972

A number of theoretical problems have been studied that are relevant to the electromagnetic probing of the environment in coal mines. Particular emphasis was given to methods of determining the roof structures in underground workings. Essentially the idea is that the structure is illuminated by a source of primary field and the secondary response is detected. This secondary field is then related to the roof structure. The following approaches were employed: (i) low frequency induction wherein the induced eddy-currents give rise to a secondary measurable field, (ii) direct current excited by probes that interact with the inhomogeneous roof structure, (iii) microwave coupling to the roof by resonant loops, (iv) microwave reflection and scattering by horn antennas. The collected results presented here are intended to provide an analytical framework for further work in this area. (ERA citation 05:011135)

FE-9125-1 PC **A06**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Development of Shaft Lining and Service Line Extension Systems Compatible with Blind Shaft Borer Excavation Rates. Phase I. Design. Final Technical Report.
J. M. Halter, and J. D. Eklund. Dec 78, 125p
PNL-2547
Contract ET-77-C-01-9125

This report presents a conceptual design of shaft lining and service line extension systems to be used in conjunction with the Blind Shaft Borer (BSB) developed by the Robbins Company. These systems will allow the BSB to advance at a rate of 50 ft/day on a steady-state basis to depths of 2000 ft. In addition, these systems will ensure that no more than 25 ft of unlined shaft remains above the transfer deck of the BSB at any given time. This design makes use of a mechanized cylindrical form to cast a quick-setting concrete lining 22 ft in diameter. The service lines are suspended from the surface and lowered into the shaft. A description of the design, operation sequences, and performance are presented for both systems. Economic feasibility and feature testing requirements are also described. (ERA citation 05:013009)

GJBX-12(80)(V.1) PC **E10**/MF **E10**
LKB Resources, Inc., Huntingdon Valley, PA.
NURE Aerial gamma-Ray and Magnetic Reconnaissance Survey, Colorado-Arizona Area: Salton Sea NI II-9, Phoenix NI 12-7, El Centro NI II-12, AJO NI 12-10, Lukeville NH 12-1 Quadrangles. Volume I. Narrative Report.
Nov 79, 258p
Contract EY-76-C-13-1664

A rotary-wing reconnaissance high sensitivity radiometric and magnetic survey, encompassing several 1:250,000 quadrangles in southwestern Arizona and southeastern California, was performed. The surveyed area consisted of approximately 9300 line miles. The radiometric data were corrected and normalized to 400 feet terrain clearance. The data were identified as to rock type by correlating the data samples with existing geologic maps. Statistics defining the mean and standard deviation of each rock type are presented as listings in Volume I of this report. The departure of the data from its corresponding mean rock type is computed in terms of standard deviation units and is presented graphically as anomaly maps in Volume II and as computer listings in microfiche form in Volume I. Profiles of the normalized averaged data are contained in Volume II and include traces of the potassium, uranium and thorium count rates, corresponding ratios, and several an-

cilliary sensor data traces, magnetometer, radio altimeter and barometric pressure height. A description of the local geology is provided, and a discussion of the magnetic and radiometric data is presented together with an evaluation of selected uranium anomalies. (ERA citation 05:011291)

GJBX-17(80) PC **A04**/MF **A01**
Bendix Field Engineering Corp., Grand Junction, CO.
Engineering Report on Drilling in the Black Hills, South Dakota.
S. Abou-Zied, and M. C. Cellihan. Jan 80, 64p
Contract EY-76-C-13-1664

The Black Hills drilling project was conducted by Bendix Field Engineering Corporation (BFEC) in support of the US Department of Energy (DOE) National Uranium Resource Evaluation (NURE) program. The project consisted of five drill holes, ranging in depth from 365 feet (111.25 m) to 564 feet (171.90 m). A total of 2,211 feet (673.91 m) were drilled, all of which were cored. The objective of the project was to obtain subsurface data which would enable us to more accurately assess the favorability of the Precambrian Estes Conglomerate as a host of World Class uranium deposits. Drilling began on August 3, 1979, and concluded on September 7, 1979, with final site restoration and clean-up. (ERA citation 05:013122)

GJBX-6(80) PC **A02**/MF **A01**
Bendix Field Engineering Corp., Grand Junction, CO.
Survey of Lands Held for Uranium Exploration, Development, and Production in Fourteen Western States in the Six Month Period Ending June 30, 1979.
Jan 80, 24p
Contract EY-76-C-13-1664

The statistics set forth for the period covered by this report are based on data gathered from records available to the public. These data were derived from public county records of mining claim locations, from the public reports of state and Federal land offices, from commercial reporting services, and from annual reports to stockholders of land companies. Accordingly, if any fee land has been acquired in a private transaction which has not been entered into a public record or report, that land will not be accounted for in this report. The figures for the acreage controlled at the beginning of the calendar year are those that were published for that date in the publication entitled Statistical Data of the Uranium Industry GJO-100. (ERA citation 05:013121)

GJBX-9(80)(V.1) PC **E06**/MF **E06**
EG and G GeoMetrics, Sunnyvale, CA.
Aerial gamma Ray and Magnetic Survey: Raton Basin Project. The Raton and Santa Fe Quadrangles of New Mexico. Final Report.
Nov 79, 80p
Contract EY-76-C-13-1664

In 1978, EG and G geoMetrics collected 4955 line miles of high sensitivity airborne radiometric and magnetic data in New Mexico within the Raton and Santa Fe quadrangles. These quadrangles represent part of the Raton Basin Project. All radiometric and magnetic data for the two quadrangles were fully reduced and interpreted by geoMetrics, and are presented as three volumes; one Volume I covering both quadrangles and separate Volume II's for the individual quadrangles. Over 50% of the survey area is covered by flat lying Mesozoic and Cenozoic deposits of the southern Great Plains Province. The western and southern portions of the area contain a combination of Precambrian and Paleozoic igneous and metamorphic rocks. These rocks occur primarily within and in close proximity to the Sangre de Cristo Mountains and late Cenozoic volcanic deposits occur to the west of the mountains and in the Las Vegas Volcanic region. Uranium deposits are scattered throughout the region, but none are known to be economic at the time of this report. (ERA citation 05:011289)

GJBX-9(80)(V.2)(Raton) PC **A10**/MF **A01**
EG and G GeoMetrics, Sunnyvale, CA.
Aerial gamma Ray and Magnetic Survey: Raton Basin Project. The Raton and Santa Fe Quadrangles of New Mexico. Final Report.
Nov 79, 216p
Contract EY-76-C-13-1664

The Raton quadrangle in northern New Mexico lies principally within the Southern Rocky Mountains and Great Plains Province. The eastern half of the quadrangle contains portions of the Raton and Las Vegas Basins, and the Sierra Grande Arch in the Great Plains Province. The west is dominated by the Sangre de Cristos and related mountain ranges of the Southern Rockies, but grades into the Rio Grande Rift Zone in the far west. Many areas in the quadrangle contain significant amounts of Cretaceous through Quaternary igneous rocks of a variety of types. Magnetic data reflect both deep and shallow sources. The basins show as regions of low frequency low amplitude wavelengths except where significant amounts of igneous rocks are exposed. The Raton quadrangle has been unproductive in terms of uranium. All known uranium occurrences to date have proven uneconomic. A total of 98 uranium anomalies are valid according to the criteria set forth in Volume I. These anomalies are scattered throughout the quadrangle. However, they fail to outline the most significant area in terms of its count rate, because of extremely high apparent thorium concentrations. (ERA citation 05:011290)

GJBX-9(80)(V.2)(Sante-Fe) PC **A14**/MF **A01**
EG and G GeoMetrics, Sunnyvale, CA.
Aerial gamma Ray and Magnetic Survey: Raton Basin Project. The Raton and Santa Fe Quadrangles of New Mexico. Final Report.
Dec 79, 324p
Contract EY-76-C-13-1664

The Santa Fe quadrangle in central New Mexico lies principally within the Southern Rocky Mountains and Great Plains Provinces. The west is dominated by the Sangre de Cristo Mountains. The eastern and southern regions contain portions of the Sierra Grande Arch and the Las Vegas and Tucumcari Basins. These structures primarily contain Permian, Triassic, Cretaceous, and Tertiary sediments. Many areas of the quadrangle are covered by Cretaceous through Quaternary igneous rocks of a variety of types. Magnetic data reflect both deep and shallow sources. The basins show as regions of low frequency/low amplitude wavelengths except where significant amounts of igneous rocks are exposed. The Santa Fe quadrangle has been unproductive in terms of uranium. All known uranium occurrences to date have proven uneconomic. A total of 219 uranium anomalies are valid according to the criteria set forth in Volume I. Two groups of anomalies in the Sangre de Cristo Mountains appear to be most significant in terms of their peak count rates. (ERA citation 05:011300)

GLR-201 PC **A04**/MF **A01**
Geoscience Ltd., Solana Beach, CA.
Development of Downhole Geothermal Heat Flux and Thermal Conductivity Transducers.
H. F. Poppendiek, D. J. Connelly, A. J. Sellers, C. M. Sabin, and J. G. Dunbar. Sep 78, 71p
Contract EG-77-C-03-1318

Two new transducers were developed which can be used in exploration holes to measure downhole geothermal heat fluxes and earth thermal conductivities. The first step in this effort consisted of analytically describing the performance characteristics of the transducers. Next, models of the transducers were built and tested in the laboratory, verifying the measurement concepts involved. Then a survey was made of possible sites where full-scale transducers could be tested in exploration holes. The two transducers were then fabricated and the test plan developed. Although some technical background material is outlined for the two transducers, the report primarily describes (1) the transducer field test effort at Middletown, (2) the downhole measurements made, and (3) the geothermal heat flux and thermal conductivity data derived from the transducer measurements. The results obtained by the two transducers are compared to each other and to other pertinent data. (ERA citation 05:010009)

HIG-78-9 PC **A03**/MF **A01**
Indiana Univ., Bloomington.
Analysis of Geophysical Logs from the Hawaii Geothermal Project Well.
A. J. Rudman. Sep 78, 29p
Contract EY-76-C-03-1093

A 6445-foot test well was completed on April 27, 1976 in the Puna Area of Hawaii as part of an extensive project to investigate a geothermal reservoir for energy production. Because bottom hole temperatures exceeded 300 exp 0 C, it was possible to run geophysical logs in the upper 3500 feet only. Study of conventional and induction resistivity, self potential, neutron, gamma ray, caliper, temperature, temperature differential and drilling rate logs show that porosity, permeability and fluid flow are qualitatively identified on the logs. Lithologic logs of sample cuttings taken at five- to ten-foot intervals (together with cores taken at approximately 700-foot intervals) substantiate preliminary findings of the porous and permeable zones. Although the logs investigated are above many of the zones of production, new information was obtained about the in-situ nature of permeability in Hawaiian basalts. (ERA citation 05:011736)

IDO-1650-T1 PC **A04**/MF **A01**
Terra Tek, Inc., Salt Lake City, UT.
Rock Properties in Support of Geothermal Resource Development.
S. W. Butters. 1979, 71p
Contract EG-77-C-07-1650

Geothermal rock mechanics needs have been defined and subsequently a test system was designed and built for providing appropriate material properties. The development areas identified as requiring rock mechanics were stimulation, reservoir engineering, subsidence prediction, surface exploration and subsurface evaluation, and drilling. The resulting test system provides mechanical, electrical, thermal and physical properties on 2 and 4 inch diameter cores at confining pressures and pore fluid pressures to 200 MPa (30,000 psi) and temperatures to 535 exp 0 C (1000 exp 0 F). The test system development was continued and site specific rock mechanics requirements were identified. (ERA citation 05:011809)

IDO-77-5-6 PC **A04**/MF **A01**
Utah Univ. Research Inst., Salt Lake City.
Dipole-Dipole Resistivity Survey of a Portion of the Coso Hot Springs KGRA, Inyo County, California.
R. C. Fox. May 78, 61p
Contract EY-76-S-07-1601

A detailed electrical resistivity survey of 54 line-km was completed at the Coso Hot Springs KGRA in September 1977. This survey has defined a bedrock resistivity low at least 4 sq mi (10 sq km) in extent associated with the geothermal system at Coso. The boundaries of this low are generally well defined to the north and west but not as well to the south where an approximate southern limit has been determined. The bedrock resistivity low merges with an observed resistivity low over gravel fill east of Coso Hot Springs. A complex horizontal and vertical resistivity structure of the surveyed area has been defined which precludes the use of layered-earth or two-dimensional interpretive models for much of the surveyed area. In general the survey data indicate that a 10 to 20 ohm-meter zone extends from near surface to a depth greater than 750 meters within the geothermal system. This zone is bordered to the north and west by bedrock resistivities greater than 200 ohm-meters and to the south by bedrock resistivities greater than 50 ohm-meters. A combination of observed increases in: (1) fracture density (higher permeability), (2) alteration (high clay content), and (3) temperatures (higher dissolved solid content of ground water) within the bedrock low explain its presence. (ERA citation 05:011730)

IDO-78-1701.b.1.1.2 PC **A03**/MF **A01**
Utah Univ., Salt Lake City. Research Inst.
Radon Emanometry as a Geothermal Exploration Technique; Theory and an Example from Roosevelt Hot Springs KGRA, Utah.
D. L. Nielson. Dec 78, 41p
Contract EG-78-C-07-1701

Four radon survey lines were established over the geothermal field of Roosevelt Hot Springs KGRA. The radon flux was determined using the Westinghouse Alpha 2 system which measures the flux at each station over a period of 30 days using an alpha-sensitive dosimeter. The method was very

successful in locating mapped fault systems that communicate with the structurally controlled geothermal reservoir. It is concluded that this method, coupled with a structural analysis, can be useful as a site-specific exploration tool, particularly in locating exploration holes in known geothermal areas. (ERA citation 05:010013)

IDO-78-1701.b.4.2 PC **A03**/MF **A01**
Utah Univ. Research Inst., Salt Lake City.
Geological and Geophysical Analysis of Coso Geothermal Exploration Hole No. 1 (CGEH-1), Coso Hot Springs KGRA, California.
R. M. Galbraith. May 78, 50p
Contract EG-78-C-07-1701

The Coso Geothermal Exploration Hole number one (CGEH-1) was drilled in the Coso Hot Springs KGRA, California, from September 2 to December 2, 1977. Chip samples were collected at ten foot intervals and extensive geophysical logging surveys were conducted to document the geologic character of the geothermal system as penetrated by CGEH-1. The major rock units encountered include a mafic metamorphic sequence and a leucogranite which intruded the metamorphic rocks. Only weak hydrothermal alteration was noted in these rocks. Drillhole surveys and drilling rate data indicate that the geothermal system is structurally controlled and that the drillhole itself was strongly influenced by structural zones. Water chemistry indicates that this geothermal resource is a hot-water rather than a vapor-dominated system. Several geophysical logs were employed to characcterize the drillhole geology. The natural gamma and neutron porosity logs indicate gross rock type and the accoustic logs indicate fractured rock and potentially permeable zones. A series of temperature logs run as a function of time during and after the completion of drilling were most useful in delineating the zones of maximum heat flux. Convective heat flow and temperatures greater than 350 exp 0 F appear to occur only along an open fracture system encountered between depths of 1850 and 2775 feet. Temperature logs indicate a negative thermal gradient below 3000 feet. (ERA citation 05:011737)

IDO-78-1701.b.5A PC **A06**/MF **A01**
Utah Univ., Salt Lake City. Dept. of Geology and Geophysics.
Geothermal Exploration and Assessment Technology Program Plan. Final Report.
30 Oct 78, 119p
Contract EG-78-C-07-1701

The following program plan elements are described: barriers to commercialization, cost/benefit analysis for exploration assessment technology (hydrothermal systems), goals, objectives, technical plan, management plan, budget, and procurement plan. (ERA citation 05:011713)

K/UR-100 PC **A04**/MF **A01**
Oak Ridge Gaseous Diffusion Plant, TN.
National Uranium Resource Evaluation Program. Hydrogeochemical and Stream Sediment Reconnaissance Procedures of the Uranium Resource Evaluation Project.
J. W. Arendt, T. R. Butz, G. W. Cagle, V. E. Kane, and C. E. Nichols. 31 Dec 79, 53p
Contract W-7405-ENG-26

Purpose of this addendum is to provide the reader of the basic data report and the detailed geochemical survey report with a readily obtainable reference explaining the overall ORGDP reporting program in detail. The document describes specific procedures used concerning field and laboratory methodology and quality control. Different types of data presentations used in the basic data reports are defined and explained in detail. (ERA citation 05:011298)

K/UR-131 PC **E06**/MF **E06**
Union Carbide Corp., Oak Ridge, TN. Nuclear Div.
Hydrogeochemical and Stream Sediment Reconnaissance Basic Data for Laredo NTMS Quadrangle, Texas.
30 Nov 79, 252p
Contract W-7405-ENG-26

Results of a reconnaissance geochemical survey of the Laredo Quadrangle, Texas are reported. Field and laboratory data are presented for 655 groundwater and 246 stream sediment samples. Statistical and areal distributions of uranium and possible uranium-related variables are displayed. Results of groundwater analysis indicate a north-south trending area in the center of the quadrangle (Duval, Webb, and Zapata Counties) as being most promising for uranium mineralization; these waters are derived mainly from the Catahoula Formation. This groundwater has high concentrations of the uranium pathfinder elements and low concentrations of specific conductance in the high uranium area. Another area showing promise of uranium mineralization is in the northeastern portion of the quadrangle (Jim Wells County) with wells producing from the Evangeline Aquifer. Three areas are indicated by stream sediment data as having potential for uranium mineralization: northwestern Duval and northeastern Webb Counties, northwestern Webb County, and southwestern Webb County. The north central area shows the most promising uranium values from streams draining the Catahoula-Frio Formations and the Jackson Group. Uranium in this area is apparently associated with heavy and/or resistate minerals. The Catahoula also has a large concentration of volcanic ash and is believed to be a major host of uranium in the survey area. Samples from streams draining the El Pico Clay in the northwest have high values of uranium, arsenic, calcium, iron, magnesium, and vanadium. High U-FL values in streams draining the Yegua Formation, in the west central portion of the quadrangle, appear to be associated with high values of aluminum and sodium and to some extent arsenic, calcium, and vanadium. (ERA citation 05:013124)

LA-UR-79-3110 PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
Permeability Enhancement Using Explosive Techniques.
T. F. Adams, S. C. Schmidt, and W. J. Carter. 1980, 12p CONF-800204-3
Contract W-7405-ENG-36
Energy-sources technology conference, New Orleans, LA, USA, 3 Feb 1980.

In situ recovery methods for many of our hydrocarbon and mineral resources depend on the ability to create or enhance permeability in the resource bed to allow uniform and predictable flow. To meet this need, a new branch of geomechanics devoted to computer prediction of explosive rock breakage and permeability enhancement has developed. The computer is used to solve the nonlinear equations of compressible flow, with the explosive behavior and constitutive properties of the medium providing the initial/boundary conditions and material response. Once the resulting computational tool has been verified and calibrated with appropriate large-scale field tests, it can be used to develop and optimize commercially useful explosive techniques for in situ resource recovery. (ERA citation 05:011278)

LA-UR-79-3113 PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
Experimentally Determined Rock-Fluid Interactions Applicable to a Natural Hot Dry Rock Geothermal System.
R. W. Charles, C. E. Holley, Jr., J. W. Tester, L. A. Blatz, and C. O. Grigsby. Feb 80, 23p CONF-800205-1
Contract W-7405-ENG-36
American Institute of Metallurgical Engineers meeting, Las Vegas, NV, USA, Feb 1980.

The Los Alamos Scientific Laboratory is pursuing laboratory and field experiments in the development of the Hot Dry Rock concept of geothermal energy. The field program consists of experiments in a hydraulically fractured region of low permeability in which hot rock is intercepted by two wellbores. These experiments are designed to test reservoir engineering parameters such as: heat extraction rates, water loss rates, flow characteristics including impedance and buoyancy, seismic activity and fluid chemistry. Laboratory experiments have been designed to provide information on the mineral reactivity which may be encountered in the field program. Two experimental circulation systems have been built to study the rates of dissolution and alteration in dynamic flow. Solubility studies have been done in agitated systems. To date, pure minerals, samples of the granodiorite from the actual reservoir and Tijeras Canyon granite have been reacted with distilled water and various solutions of NaCl, NaOH, and Na sub 2 CO sub 3. The results of these experimental systems are compared to observations made in field experiments done in a hot dry rock reservoir at a depth of approximately 3 km with initial rock temperatures of 150 to 200 exp 0 C. (ERA citation 05:011811)

LA-UR-79-3256 PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
Energy from Hot Dry Rock.
R. H. Hendron. 1979, 22p CONF-791216-1
Contract W-7405-ENG-36
Conference on long-term energy resources, Montreal, Canada, 3 Dec 1979.

The Hot Dry Rock Geothermal Energy Program is described. The system, operation, results, development program, environmental implications, resource, economics, and future plans are discussed. (ERA citation 05:008396)

LA-7813-PR PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
Explosively Produced Fracture of Oil Shale. Progress Report, July-September 1978.
S. C. Schmidt. Nov 79, 24p
Contract W-7405-ENG-36

A generalized constitutive stress-strain relation that accounts for crack growth is presented. The effects of both tensile and shear stresses on crack strain are included. Macroscopic properties are determined by averaging over a crack distribution function. A bedded crack version of the fracture model has been incorporated into the YAQUI hydrodynamics code. Test calculations of free-surface spall with and without fracture show a distinct difference in the behavior of the reflected tension wave. Performance properties of the commercial explosive TAL-1005 E have been calculated from experimental data. Results of identical tests for nitromethane are also shown. Crater blast data for both laboratory- and field-size experiments are given. Results are interpreted using published empirical cratering and fragmentation techniques. (ERA citation 05:011277)

LA-7871-PR PC **A03**/MF **A01**
Los Alamos Scientific Lab., NM.
Explosively Produced Fracture of Oil Shale. Progress Report, October-December 1978.
S. C. Schmidt. Nov 79, 37p
Contract W-7405-ENG-36

Tracer gas flow and pressure decay of a proposed oil shale retort have been studied using a finite difference formulation of a Darcy fluid flow model. The pressure decay studies were conducted to simulate proposed governmental mine test requirements. Modeling tracer gas flow in a retort illustrates the effect of a tight formation on the overall flow characteristics. Preshot geologic characterization of the highly instrumented single-borehole explosive test shots in the Colony Mine is described. A rate formulation of the anisotropic stress-strain constitutive law is given. The total strain rate used includes both elastic and plastic deformation. An analysis of frictional effects on shear cracks is presented. An initial computational procedure for modeling fracture is presented. (ERA citation 05:013099)

LA-8024-PR PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
Explosively Produced Fracture of Oil Shale. Progress Report, January-March 1979.
Jan 80, 12p
Contract W-7405-ENG-36

The theory describing the average strain resulting from a random distribution of cracks in a stressed medium has been used to determine the reduced modulus of a material containing a distribution of cracks that is isotropic in orientation and exponential in size distribution. The density, porosity, and elastic velocities were determined for oil shale samples taken from a single core from Tract C-a, Colorado. Initial results from two instrumented grout injection tests in the Colony Oil Shale Mine, Grand Valley, Colorado, show that a rapid setting grout can be used to create overstressed regions in selected areas of the mine floor and wall. (ERA citation 05:013100)

LA-8092-PR PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
Hydrochemical and Stream Sediment Reconnaissance of the National Uranium Resource Evaluation Program, Primarily for the Rocky Mountain States of New Mexico, Colorado, Wyoming, Montana, and the State of Alaska. Semiannual Progress Report, April-September 1979.
W. A. Morris, M. E. Bunker, G. R. Waterbury, and R. A. Waller. Oct 79, 21p
Contract W-7405-ENG-36

Reconnaissance sampling was done in five partially completed quadrangles, the North Slope of Alaska, and the Panhandle of Alaska. Detailed geochemical survey sampling was done in nine follow-up study areas. About 23,000 waters and 25,000 sediments were collected, bringing the LASL totals to 165,000 waters and 185,000 sediments from 220,000 locations. Almost all of the Rocky Mountain region and 85% of Alaska have been sampled. About 9000 water and 22,000 sediment samples were analyzed for the standard LASL multielement suite (uranium plus 43 additional elements). Work continued on improving and automating all analytical techniques and building a state-of-the-art emission spectrograph for waters and sediments. The second neutron activation line became operational in July, bringing the sediment throughout to the designed 400 samples per day. Seven multielement reconnaissance reports, one detailed geochemical survey report, one semiannual progress report, and one topical report were open filed at the US DOE Grand Junction Office, Colorado. (ERA citation 05:008131)

LA-8158-MS PC **A03**/MF **A01**
Los Alamos Scientific Lab., NM.
Analysis of Bidding Data on Offshore Oil Lease Sales.
W. J. Conover, R. L. Iman, R. Pavur, and L. A. Bruckner. Nov 79, 33p
Contract W-7405-ENG-36

Several types of statistical analyses are reported on the bidding data for offshore oil leases in the five sales from 1954 to 1967, in an attempt to obtain a method for identifying leases that become productive. These methods include using standardized variables, nonstandardized variables, stepwise regression on the variables, stepwise regression on the ranks of the variables, maximum likelihood estimation of the parameters, PRESS, and metroglyphs. While the methods using ranks seem to identify the producers a higher percentage of the time, the methods using the data are more accurate in identifying nonproducing leases. The percentage of correct classification was usually in the 60 to 70 percent range for all methods attempted. No single variable seems to be a consistently accurate predictor of whether a lease will be a producer or a nonproducer. (ERA citation 05:012036)

LA-8175-PR PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
Geostatistics Project of the National Uranium Resource Evaluation Program. Progress Report, April-September 1979.
J. A. Howell, T. R. Bement, and P. L. Buslee. Dec 79, 8p
Contract W-7405-ENG-36

An attempt is underway to develop a uranium favorability index. Thirty-nine openfiled quadrangles are being used in the study. A report is being prepared in cooperation with Bendix Field Engineering Corporation geologists, which will deal with probability distributions in aerial radiometric data. (ERA citation 05:013125)

LA-8197-MS PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
Pressure Losses at the Transition from Radial Flow within Fractures to Longitudinal Flow within Production Wells.
H. Murphy, and R. Pearce. Jan 80, 22p
Contract W-7405-ENG-36

Improved energy production from many types of energy reservoirs requires a better understanding of the fluid mechanics in the vicinity of the fracture-wellbore intersection. Typically, the aperture (smallest dimension) of a hydraulic fracture is only of the order of 1 mm (0.04 in) so that reasonable energy production rates from geothermal systems require fairly large flow velocities within the fractures, which often result in non-Darcian flow. Near the production well at several well diameters away, the flow within the fracture is predominantly radial; however, as the immediate intersection with the well is approached, a significant component of momentum is directed in the longitudinal, or wellbore, direction. However, since radial momentum still increases with decreasing radius, the flow at the turn into the production well forms a vena contracta. Downstream of this vena contracta the flow expands to fill the entire well diameter. This expansion results in a reduction of longitudinal momentum accompanied by an adverse pressure gradient, i.e., one in which pressure increases in the flow direction. The adverse pressure gradient results in flow separation, enhanced turbulence, and large pressure losses. These flow phenomena were investigated experimentally for the simple case where the fracture plane and the wellbore drilling axis are orthogonal. Measurements included the pressure loss associated with the transition from radial fracture flow to longitudinal wellbore flow, the flow area constriction represented by the vena contracta, and the downstream distances where attachment, and then fully developed wellbore flow, began. (ERA citation 05:011787)

LBL-9056(Rev.) PC **A03**/MF **A01**
California Univ., Berkeley. Lawrence Berkeley Lab.
Numerical Model of Transient Two-Phase Flow in a Wellbore.
C. W. Miller. Oct 79, 31p
Contract W-7405-ENG-48

Transient two-phase flow in a geothermal well has been modelled with a finite-difference approximation. One-dimensional flow is assumed. The equations of mass, momentum, and energy are solved using a partially implicit method. Terms that would place a severe time restriction on the calculation are solved implicity, while other terms are solved explicitly for computational ease and efficiency. Homogenous flow of one component at thermodynamic equilibrium is assumed initially, but the extension of the model to include slip and a finite rate of condensation or evaporation or a noncondensible gas is given. The wellbore model includes heat and mass transfer and is coupled to a simple reservoir model. Using the model, the transient behavior of a single- or two-phase well during a well test was investigated. Results show that when the reservoir has a relatively large value of kh, as exists in a geothermal field, the slope of the log (pressure) vs log (time) curve is not necessarily a unit slope when testing a homogenous reservoir. The early-time behavior of this curve is controlled by the interaction of the flow in the reservoir and that in the well, and can be used to determine near bore values of kh. Heat loss in the wellbore is shown to also affect the pressure vs time plot in a well test. The time to reach the pseudo steady region increases when heat transfer is important, even in a relatively warm well, and the slope of the P vs log t curve is no longer q mu /4 pi kh as derived in the petroleum literature. (ERA citation 05:013432)

METC/CR-79/18 PC **A03**/MF **A01**
Marietta Coll., OH. Dept. of Petroleum Engineering.
Comparison of Methods Used for Determining the Natural Gas Content of Coalbeds from Exploratory Cores.
R. W. Chase. Dec 79, 27p

Several methods are available for determining the natural gas content of coal seams. Such methods generally yield quite different results when applied to the same exploratory core sample taken from a coalbed. A modification of the US Bureau of Mines direct method is presented which utilizes decline curves to approximate the volumes of gas which are recoverable based on exploratory cores from coalbeds. The gas contents of 20 exploratory bituminous coal cores were determined using the indirect, the direct, and the decline curve methods and are summarized in Table 6. A comparison of the values obtained using the three methods for any particular sample reflects significant differences in the estimation techniques. The decline curve approach yields values for recoverable gas content which consistently lie between the values of total gas content found using the indirect and direct methods as witnessed in Table 6. Since the decline curve for a coal sample is a direct representation of the method by which gas is actually released from the coal, the recoverable gas content value obtained for a sample is felt to be more representative of the coal than those values obtained by the indirect and direct methods. (ERA citation 05:013004)

NVO-0685 PC **A03**/MF **A01**
Petroleum Technology Corp., Redmond, WA.
Chemical Explosive Fracturing Devonian Shale Kentucky. First Annual Summary Report, July 1, 1976-June 30, 1977.
S. J. LaRocca, and A. M. Spencer. Feb 79, 31p
Contract EY-76-C-08-0685

This first annual report of DOE Contract No. EY-76-C-08-0685 presents the beginning efforts of a chemical explosive fracturing program to stimulate Devonian shale gas production in eastern Kentucky. A 12-year old below average production gas well was obtained as the first test well in a three well program. Selection was based on geological, off-set well and surface lineament factors. Prior to stimulation, the well was to be cleaned out and flow tested as a data base for post-shot evaluation. Initial clean out was hampered due to water inflow. It became necessary to cement in a new casing liner to seal the wellbore from the subsurface water which had corroded through the old casing. Clean out to total depth was successfully accomplished with a cable too rig. The well is now being flow tested in preparation for chemical explosive stimulation. Gamma ray, temperature and caliper logs, and the procedures for clean out and well testing are appendices to the report. (ERA citation 05:013093)

N80-20787/1 PC **A03**/MF **A01**
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, OH.
Assessment of Satellite and Aircraft Multispectral Scanner Data for Strip-Mine Monitoring.
E. W. Spisz, and J. T. Dooley. Mar 80, 39p
NASA-TM-79268, E-187
Original Contains Color Illustrations.

The application of LANDSAT multispectral scanner data to describe the mining and reclamation changes of a hilltop surface coal mine in the rugged, mountainous area of eastern Kentucky is presented. Original single band satellite imagery, computer enhanced single band imagery, and computer classified imagery are presented for four different data sets in order to demonstrate the land cover changes that can be detected. Data obtained with an 11 band multispectral scanner on board a C-47 aircraft at an altitude of 3000 meters are also presented. Comparing the satellite data with color, infrared aerial photography, and ground survey data shows that significant changes in the disrupted area can be detected from LANDSAT band 5 satellite imagery for mines with more than 100 acres of disturbed area. However, band-ratio (bands 5/6) imagery provides greater contrast than single band imagery and can provide a qualitative level 1 classification of the land cover that may be useful for monitoring either the disturbed mining area or the revegetation progress. However, if a quantitative, accurate classification of the barren or revegetated classes is required, it is necessary to perform a detailed, four band computer classification of the data.

ORO-5194-T1 PC **A03**/MF **A01**
West Virginia Univ., Morgantown. Dept. of Geology and Geography.
Devonian Shale Program. Quarterly Progress Report, April-June 1979.
J. N. Negus-de Wys, J. M. Dixon, M. A. Evans, K. D. Lee, and B. R. Long. 1979, 32p
Contract EY-76-C-05-5194

The tabulation of subsurface tops for several formations was completed for the Midway-Extra-Cottageville area, and a production study of the Midway-Extra field was also completed. Other studies (geophysical, fracture, structural, hydrologic) are also reported. (ERA citation 05:013083)

ORO-5194-T2 PC **A02**/MF **A01**
West Virginia Univ., Morgantown. Dept. of Geology and Geography.

Devonian Shale Program. Quarterly Progress Report, July-September 1979.
R. C. Shumaker, J. Negus-de Wys, J. M. Dixon, M. A. Evans, and K. D. Lee. 1979, 23p
Contract EY-76-C-05-5194

Objectives are to analyze the potential natural gas productivity of the Black Shales in eastern Kentucky and western West Virginia. Progress during this quarter is reported on regional structure and production studies. (ERA citation 05:013084)

ORO-5194-T5 PC **A02**/MF **A01**
West Virginia Univ., Morgantown. Dept. of Geology and Geography.
Quarterly Progress Report, October-December 1979.
1979, 18p
Contract EY-76-C-05-5194

Objective was to study gas production from shales in eastern Kentucky and western West Virginia. Work reported include geologic structure studies, maps, etc. (ERA citation 05:013085)

ORO-5198-T6 PC **A02**/MF **A01**
Pennsylvania Dept. of Environmental Resources, Harrisburg.
DOE Eastern Gas Shales Project: Dunkirk Study. Quarterly Report of Technical Progress, July, August, September 1979.
J. A. Harper, K. D. Abel, and R. G. Piotrowski. 1979, 2p
Contract EY-76-S-05-5198

Ten cross sections were completed and drafted, and blueline copies were sent to DOE, Morgantown, WV, for review. These cross sections were used as the basis with which all other logs in the study area were correlated. The data has been encoded from 228 logs that were used. Two isopach, 2 structure contour, and 3 lithofacies maps have been completed and are awaiting drafting. A production and show map has been drafted and blueline copies were sent to DOE, Morgantown, WV, for review. The schedule of work was delayed due to the state budget problems the need to correct work previously completed and sent to DOE, Morgantown, WV, and lack of a reproduction contract. (ERA citation 05:011204)

ORO-5203-3(80) PC **A03**/MF **A01**
Illinois State Geological Survey, Urbana.
Geologic and Geochemical Studies of the New Albany Group (Devonian Black Shale) in Illinois to Evaluate Its Characteristics as a Source of Hydrocarbons. Quarterly Progress Report, October 1-December 31, 1979.
R. E. Bergstrom, and N. F. Shimp. 7 Jan 80, 38p
Contract EY-76-C-05-5203

This project is a detailed analysis of the lithology, stratigraphy, and structure of the New Albany Group in Illinois to determine those characteristics of lithology, thickness, regional distribution, vertical and lateral variability, and deformation that are most relevant to the occurrence of hydrocarbons. Research is reported for this quarter in the following areas: coordination of stratigraphic maps, mineralogic and petrographic characterization, physical properties of Devonian black shale, quantitative determination of major, minor, and trace elements in shales, inorganic/organic associations of trace elements in black shales, mode of occurrence and relative distribution of hydrocarbon phases in shale, and adsorption/desorption studies of gases through shales. 6 figures, 7 tables. (ERA citation 05:011275)

ORO-5243-T1 PC **A07**/MF **A01**
Texas Univ. at Austin. Center for Energy Studies.
United States Gulf Coast Geopressured Geothermal Program: Special Projects Research and Coordination Assistance. Final Report, October 1, 1977-November 30, 1978.
M. H. Dorfman, and D. G. Bebout. Apr 79, 133p
Contract EY-76-S-05-5243

The activities involved in the coordination assistance function are reviewed including: technical assistance and liaison; technical assistance for review and evaluation of proposals and contract results; technical assistance and coordination for geopressure geothermal test well; technical assistance, coordination, and planning of surface component test facility; legal research in geopressure geothermal resource development; and operation of geopressure geothermal information service. This function takes the form of providing liaison with various industrial components that participate in the program and with state and local agencies. (ERA citation 05:011723)

PB80-164072 PC **A05**/MF **A01**
Terra Tek, Inc., Salt Lake City, UT.
Correlation of the Material Properties of Tungsten Carbide Inserts with Drilling Performance in Hard Formations. Phase I.
Final rept.,
R. A. Cutler, R. R. Hendrickson, R. Lingle, and S. E. Yamada. Jan 80, 91p TR-80-8, NSF/RA-800010
Grant NSF-DAR77-13273

Twenty tungsten carbide (WC) mining grades with cobalt (Co) and nickel binders were tested to determine their physical and mechanical properties. Metallography and energy dispersive spectroscopy detected a WTiC phase in six of the grades. The presence of TiC significantly lowers the fracture toughness of the inserts. Grades containing nickel binders had lower abrasion resistance, crack resistance and fracture toughness for a given hardness, when compared to WC-Co cermets. Six grades displaying a wide range of properties were selected for field testing during Phase II in order to correlate the properties of the inserts with their performance during drilling in taconite ore. Abrasion resistance, Palmqvist crack resistance, Rockwell A hardness, short rod fracture toughness and transverse rupture strength measurements were used as the criteria for the selection of field test grades.

PB80-167430 PC **A06**/MF **A01**
Engineers International, Inc., Downers Grove, IL.
Effectiveness of Inclined Roof Bolts in Coal Mines.
Final rept. 28 Jun 77-27 Jun 78,
Madan M. Singh. Jul 78, 115p BUMINES-OFR-40-80
Contract J0275031

This report presents the results of an investigation of inclined roof bolts, anchored over pillars, in room-and-pillar coal mines susceptible to shear failures of the roof. Although the field data do not support this contention, it is believed on the basis of analyses and other work that inclined roof bolts do offer potential under some circumstances.

PB80-167455 PC **A08**/MF **A01**
Ingersoll-Rand Research, Inc., Princeton, NJ.
Remote Operator Coal Mine Roof Bolter Concepts Utilizing Existing Techniques and Components.
Open file rept. (Final) Oct 77-Sep 78,
G. Hakes, and T. Haviland. Sep 78, 169p
BUMINES-OFR-39-80
Contract H0272028

A data bank on bolter technology was assembled that included state-of-the-art industrial equipment as well as new equipment currently under development for the Bureau of Mines. This information was augmented by visits to Bureau of Mines contractors, mine operators, and others to obtain a thorough understanding of present coal mine roof bolting safety and productivity problems. Using this background material and information, a series of roof bolter concepts was developed offering improved operator safety with minimum impact on productivity. The concepts developed use existing componentry and technology wherever possible. All of the concepts feature a fully protected operator station located 6 to 10 feet outby the active bolt line and the hazardous rotating machinery.

PB80-177116 PC **A11**/MF **A01**
Battelle Columbus Labs., OH.
Coal Preparation Plant Computer Model: Volume I. User Documentation.
Final rept. Jul 76-Jul 79,
Frederick K. Goodman, and Jane H. McCreery. Jan 80, 249p EPA-600/7-80-010A
Contract EPA-68-02-2163
See also Volume 2, PB80-177124.

The two-volume report describes a steady state modeling system that simulates the performance of coal preparation plants. The system was developed originally under the technical leadership of the U.S. Bureau of Mines and the sponsorship of the EPA. The modified form described in this report, written in Fortran, was developed by Battelle for the EPA. The original modifications made the program usable in evaluating an advanced coal cleaning facility being constructed at Homer City, PA. Subsequent changes allowed the model to be used for a wider range of performance and cost evaluations. Initial changes to the original program increased the number of process operations which could be simulated, and simplified program operation. Later modifications permitted the calculation of plant water flows and the estimation of plant costs. Volume I contains user documentation, and Volume II provides process documentation. Volume I describes the manner in which coal flows are represented, the mathematical approach of the various unit operations, the cost evaluation approach, preparation of the input, and interpretation of the output (the last two in terms of an example).

PB80-177124 PC **A14**/MF **A01**
Battelle Columbus Labs., OH.
Coal Preparation Plant Computer Model: Volume II. Program Documentation.
Final rept. Jul 76-Jul 79,
Frederick K. Goodman, and Jane H. McCreery. Jan 80, 316p EPA-600/7-80-010B
Contract EPA-68-02-2163
See also Volume 1, PB80-177116.

The two-volume report describes a steady state modeling system that simulates the performance of coal preparation plants. Program documentation begins in Volume II with a discussion of basic documentation principles, followed by presentation of each routine and common block in terms of these principles.

RLO-1040-T1 PC **A18**/MF **A01**
Oregon State Dept. of Geology and Mineral Industries, Portland .
Geothermal Resource Assessment of Mount Hood. Final Report.
D. A. Hull. Jul 79, 414p
Contract EG-77-C-06-1040

Five papers are included. Separate abstracts were prepared for each one. (ERA citation 05:013393)

RLO-2229-T7-2 PC **A05**/MF **A01**
Alaska Univ., Fairbanks. Geophysical Inst.
Utilization of Geothermal Energy Resources in Rural Alaskan Communities. Final Report, June 1-December 31, 1974.
R. B. Forbes, L. Leonard, and D. H. Dinkel. Dec 74, 87p
Contract EY-76-S-06-2229-007

Three potential geothermal sites in Alaska are discovered. The history of previous use of the hot springs, the socio-economic factors, energy needs, and total energy utilization plans of selected Alaskan thermal springs are presented. Proposed research programs for the sites and environmental hazards and protection are described. (ERA citation 05:013420)

SAN-1093-T5 PC **A03**/MF **A01**
Hawaii Univ., Honolulu.
Hawaii Geothermal Project: Modelling of a Volcanic Island Geothermal Reservoir.
P. Cheng, and K. H. Lau. Sep 78, 42p
Contract EY-76-C-03-1093

Prior to the drilling of the HGP-A well, it had generally been assumed that geothermal reservoirs on the Island of Hawaii were low-temperature liquid-dominated reservoirs which were constantly recharged from the ocean. Two numerical studies based on this conceptual model were carried out to investigate heat transfer and fluid flow characteristics in such a reservoir. It was found that (1) even under the most unfavorable conditions, i.e., in the absence of caprock for the prevention of heat loss and with constant recharge from cold seawater, it is possible to have a large amount of hot water at shallow depth, (2) the upwelling of the water table resulting from geothermal heating is small, and (3) the rate of contraction of isotherms resulting from the withdrawal of fluid from a production well depends not only on the withdrawal

rate, but also on the size of the heat source and the relative location of the production well and the heat source. After the drilling of the HGP-A well had been completed in April 1976, it was found from the core samples that the permeability of the formation varies with depth, and that the low salinity of the water samples taken from the well indicates that there is a barrier between the well and the ocean, preventing the free flow of seawater. Thus, a third numerical model taking into consideration the layered structure of the formation, with recharge and discharge through an upper permeable boundary, was carried out to simulate the free convection processes at the Kapoho geothermal field. In addition, analytical studies on convective heat transfer from dikes and sills in an aquifer with high permeability have been performed, and analytical expressions for heat transfer rates and the size of the hot water zone from hot intrusives have been obtained. (ERA citation 05:013397)

SAN-1093-T6 PC **A03**/MF **A01**
Hawaii Univ., Honolulu.
Hawaii Geothermal Project. Summary Report.
Sep 78, 26p
Contract EY-76-C-03-1093

An overview of the first five years of the Hawaiian Geothermal Project and a brief report of the management and coordination activity are presented. The first three phases are: exploratory surveys, experimental drilling, and well testing and analysis. A list of publications and a chronology of events are included. (ERA citation 05:013405)

SAN-1315-1 PC **A04**/MF **A01**
Systems, Science and Software, La Jolla, CA.
Improved Geothermal Well Logging Tools Using No Downhole Electronics. Final Report.
H. R. Kratz, E. A. Day, and W. G. Ginn. Jul 79, 74p
Contract EY-76-C-03-1315

A geothermal sonde for measuring temperature and pressure using no downhole electronics was designed and tested for operation at temperatures up to 275 exp 0 C (527 exp 0 F) and pressures of at least 10,000 psi. The measurement system uses variable resistance transducers which are powered in series by an uphole constant current supply. The output signals from the transducers are measured with a digital voltmeter having very high common mode and normal mode rejection ratios. The high rejection ratios of the digital voltmeter virtually eliminate any noise or pickup introduced into the measurement system. The system was tested in a hydroclave at temperatures up to 288 exp 0 C (550 exp 0 F) and at pressure up to 8,000 psi. The sonde was also tested in the Los Alamos geothermal well at temperatures up to 186 exp 0 C (366 exp 0 F) and pressures up to 4100 psi. The main problems encountered were associated with pressure transducers and the logging cable or the cable head and connector. The results of this project indicate that this is a feasible method of making geothermal measurements without the use of downhole electronics and that with further development the technique could be extended to higher temperatures and pressures. (ERA citation 05:011738)

SAN-1325-T1 PC **A04**/MF **A01**
Hughes Aircraft Co., Culver City, CA.
Development of Improved Gaskets, Sealants and Cables for Use in Geothermal Well Logging Equipment. Final Summary Report.
S. Schwartz, D. Basiulis, R. Leyden, and A. Landis. Oct 78, 58p
Contract EG-77-C-03-1325

The inventigation of materials which could be used for fabricating elastomeric seals for geothermal well logging equipment is described. The seals were to be made either from a methylphonylcarborane-siloxane base gum stock, or from new fluoroelastomer compounds synthesized at Hughes Aircraft Company. A literature search was made to obtain data on carborane-siloxane polymers, synthesis routes for fluorinated elastomers and high temperature hydrolytic stability tests of elastomers. Information was obtained on the first two topics, but very little was available on hydrolysis testing. A number of compounds, based on carborane-siloxane, were formulated and cured. Compression set, hardness and shrinkage tests with postcure variations were made on the most promising formulations. A simple hydrolytic stability test at 275 exp 0 C (525 exp 0 F) and 830 psi was developed which indicated that both the carborane and siloxane bonds were easily broken after short exposure periods. Thermodynamic calculatons indicated that this result could be expected. Because of the agreement between empirical and theoretical data, work on the carborane-siloxanes was discontinued after approximately the first year. Synthesis efforts to produce a highly fluorinated elastomer based on perfluoroikylene oxide were continued through the entrie program. None of these routes produced a satisfactory elastomer. (ERA citation 05:011739)

SAN-2069-1-T1 PC **A04**/MF **A01**
Texas Univ. at Austin. Dept. of Chemical Engineering.
Support Research on Chemical, Mechanical, and Environmental Factors in Underground Coal Gasification. Quarterly Report.
T. F. Edgar, M. J. Humenick, T. W. Thompson, and K. E. Gray. 1 Jul 79, 71p
Contract ET-78-S-03-2069

This quarterly progress report covers research work performed at the University of Texas at Austin on evaluating chemical, mechanical and environmental factors in underground gasification of Texas lignite. (ERA citation 05:011075)

SAN-2121-2 PC **A07**/MF **A01**
JM Energy Consultants, Inc., Los Angeles, CA.
Streamlining the Federal Geothermal Leasing and Permitting Process: Background Papers, Analysis and Recommendations.
30 Jul 78, 128p
Contract ET-78C-03-2121

The federal leasing and permitting programs were analyzed as well as those of the five states in the Pacific Region. The relevant statutoring and regulatory frameworks of the land management agencies involved were also analyzed, as well as the options prepared by the DOE Streamlining Task Force and the California State-Federal-Local Task Group. The present stationary responsibilities and management structure of the Forest Service, BLM, and the Pacific Region States, as well as the roles of DOE and DOD. (ERA citation 05:013414)

SAND-79-1360 PC **A08**/MF **A01**
Sandia Labs., Albuquerque, NM.
FY 79 Lava Lake Drilling Program: Results of Drilling Experiments.
R. R. Neel, R. P. Striker, and R. M. Curlee. Dec 79, 172p
Contract EY-76-C-04-0789

A drilling program was conducted in December 1978 and January and February 1979 to continue the characterization of the solid and liquid rock components of the Kilauea Iki lava lake. Six holes were drilled from the surface and two previously drilled holes were reentered and deepened for the purposes of measuring downhole temperature profiles, recovering samples of solid, plastic, and molten rock, measuring crust permeability, and determining the performance of conventional and special drilling techniques. Conventional HQ-size (3.78 inches diameter) core drilling equipment using water for cooling and cuttings removal was used to successfully drill during initial entry into 1052 exp 0 C formations. Conventional drilling in reentering flow-back rock was less reliable. The specially designed water jet-augmented drag bit or water jet-augmented core bit was needed to drill reliably into the plastic flow-back rock and through liquid rock veins. This document contains the drill performance data which were recorded during drilling in the crust and the plastic and molten rock zones using both conventional and special drilling procedures and equipment. (ERA citation 05:011773)

SAND-79-1880C PC **A03**/MF **A01**
Sandia Labs., Albuquerque, NM.
Drill Stem Steels for Use in Geothermal Environments.
R. Salzbrenner. 1980, 39p CONF-800204-1
Contract EY-76-C-04-0789
Energy-sources technology conference, New Orleans, LA, USA, 3 Feb 1980.

Steels which are used in drill stem for conventional drilling have been selected primarily to satisfy certain static strength requirements and cost considerations. As the environments in which drilling is performed become more severe (e.g., in geothermal fluids) additional considerations must be given to the design of alloys which are resistant to general corrosion, stress corrosion, and corrosion fatigue. General design considerations for steel alloys which should provide an enhanced resistance to geothermal drilling operations are presented. These considerations include discussion of the chemistry and metallurgical substructure, and how their variation affects the mechanical and corrosion properties of steel used for drill stem applications. A duplex ferritic-martensitic steel has an advantageous combination of compositional and microstructural features which should lead to improved chemical resistance (particularly to hydrogen sulfide) as well as provide a good combination of strength and toughness properties. This duplex steel is based on the iron-2.0 weight percent silicon-0.1 weight percent carbon system, and offers the potential of enhanced performance in geothermal drilling as well as low alloy cost. (ERA citation 05:011775)

SAND-79-1981 PC **A05**/MF **A01**
Sandia Labs., Albuquerque, NM.
Corrosion of Some Pure Metals in Basaltic Lava and Simulated Magmatic Gas at 1150 exp 0 C.
D. L. Douglass, and J. T. Healey. Dec 79, 77p
Contract EY-76-C-04-0789

The work summarized was designed to provide an understanding of the reaction mechanisms and modes of degradation of various metals so that the best generic types of alloys can be selected for structural components and instrumentation. Fifteen pure metals were studied. These included base metals such as iron, nickel, and cobalt; some precious metals: platinum, rhodium and palladium (possible thermocouple or lead wire materials); refractory metals: tungsten, molybdenum, tantalum, niobium, vanadium, rhenium; plus other high melting metals such as titanium and zirconium. Samples were exposed to basaltic lava at 1150 exp 0 C for periods of 24 and 96 hours. A cover gas was used to produce oxygen and sulfur fugacities corresponding to those of the gases dissolved in basaltic melts. The corrosion behavior is described. Extensive analyses of the reaction products by scanning electron microscopy, x-ray energy dispersive analysis, electron microprobe analysis, and metallography are presented for each metal. The products formed are discussed with reference to thermodynamic stability diagrams, and the reaction path concept is used to explain some of the corrosion product morphologies. (ERA citation 05:011785)

SAND-79-1986 PC **A03**/MF **A01**
Sandia Labs., Albuquerque, NM.
Packer Induced Stresses During Hydraulic Well Fracturing.
W. E. . Warren. Dec 79, 36p
Contract EY-76-C-04-0789

Well bore stresses induced by inflatable packers during hydraulic fracturing operations are investigated. The geologic formation is modeled as an unbounded homogeneous isotropic linear elastic solid containing an infinitely long circular cavity, while the packer is modeled as a semi-infinite thin walled circular cylindrical shell. For given packer properties, these induced stresses are shown to depend on the difference between packer pressure and fracturing pressure and can become significant. Typical numerical results are obtained and presented graphically. Analytical approximations for the maximum values of these stresses are also presented. While these effects are of no importance in the usual applications of hydraulic fracturing to enhance oil and gas recovery, they are crucial in attempts to estimate in-situ stresses from hydraulic fracturing pressure data. 7 figures. (ERA citation 05:011209)

SAND-79-2271A PC **A02**/MF **A01**
Quartex, Inc., Salt Lake City, UT.
Quartz Resonator Pressure Transducer for Geothermal Well Logging.
E. P. EerNisse, and T. D. McConnell. 1979, 5p

Contract EY-76-C-04-0789

The development of a quartz resonator pressure transducer for geothermal well logging applications at up to 275 exp 0 C and pressure up to 52 MPa is described briefly. (ERA citation 05:011740)

SAND-79-2272A PC **A02**/MF **A01**
Sandia Labs., Albuquerque, NM.
Monoconductor Cables and Cableheads.
J. A. Coquat. 1979, 2p
Contract EY-76-C-04-0789

A reliable, low noise interconnect system is needed between the up-hole electronics (cool) and the down-hole (hot) electronics. A project to develop such a single conductor base interconnect system is discussed including successes to date, on-going work, and plans for the near future. (ERA citation 05:011741)

SAND-79-2274A PC **A02**/MF **A01**
Sandia Labs., Albuquerque, NM.
Upgrading Mechanical Tools: Survey Clocks.
B. H. Major. 1979, 3p
Contract EY-76-C-04-0789

Results of testing on survey clocks are reported and recommendations for upgrading them are listed. Each of the clocks were field tested after modification and some seals leaked. (ERA citation 05:011742)

SAND-79-2389 PC **A03**/MF **A01**
Sandia Labs., Albuquerque, NM.
Oil Shale Programs. Fifteenth Quarterly Report, July 1979-September 1979.
A. L. Stevens. Dec 79, 48p
Contract EY-76-C-04-0789

This document describes the work in three programs: (1) Diagnostics and Rock Mechanics Support for the Laramie Energy Technology Center (LETC) In Situ Oil Shale Program;; (2) Advanced Instrumentation and Field Projects for In Situ Oil Shale Processing; and (3) In Situ Bed Preparation Study. (ERA citation 05:013107)

SAND-79-2398 PC **A07**/MF **A01**
Sandia Labs., Albuquerque, NM.
Geothermal Drilling and Completion Technology Development Program. Quarterly Progress Report, October-December 1979.
S. G. Varnado. Jan 80, 130p
Contract EY-76-C-04-0789

The progress, status, and results of ongoing Research and Development (R and D) within the Geothermal Drilling and Completion Technology Development Program are described. The program emphasizes the development of geothermal drilling hardware, drilling fluids, and completion technology. Advanced drilling systems are also under development. The goals of the program are to develop the technology required to reduce well costs by 25% by 1982 and by 50% by 1986. (ERA citation 05:013427)

SGP-TR-28 PC **A04**/MF **A01**
Stanford Univ., CA.
Stimulation and Reservoir Engineering of Geothermal Resources. First Annual Report, June 1, 1977-March 31, 1978.
P. Kruger, and H. J. Ramey, Jr. Apr 78, 68p
Contract EY-76-S-03-0326-050

The large geothermal reservoir model has been used to investigate the specific energy extraction capabilities of various production methods and to determine the rate of heat loss from various rock formations. A parallel laboratory and field study in radon analysis is described. In order to quantify the emission rates of radon from reservoir rocks, an experimental apparatus is under construction to provide exact information on the temperature, pressure, and rock property dependence of the radon production. Laboratory cores were used in bench-scale experiments to determine steam/water relative permeability curves for permeable formation; to investigate the property of vapor pressure lowering of water confined in porous media at low saturations; and to determine the effects of high confining pressures and temperatures on the absolute permeability of porous rocks. The well test analysis and educatonal programs are reported. (ERA citation 05:011789)

SGP-TR-35 PC **A06**/MF **A01**
Stanford Univ., CA. Stanford Geothermal Program.
Stimulation and Reservoir Engineering of Geothermal Resources. Second Annual Report, July 1, 1978-September 30, 1979.
P. Kruger, and H. J. Ramey, Jr. Sep 79, 112p
Contract EY-76-S-03-0326-050

Individual projects are grouped under four main areas of study: energy extraction, bench-scale flow experiments, radon tracer techniques, and well test analysis. The energy extraction experiments concern the efficiency with which the in-place heat and fluids can be produced in the most economical manner. The bench-scale flow experiments cover the results of three models used to examine the properties of flow through porous media at elevated temperature and pressures. Random tracer techniques describe accelerated efforts to field test several geothermal reservoirs by both transient and transect test procedures. The well test analysis section describes several new developments: analysis of earth-tide effects, pressure transient analysis of multilayered systems, interference testing with storage and skin effects, determination of steam-water relative permeability from wellhead data, well test analysis for wells produced at constant pressure, the parallelepiped model, slug test DST analysis, and pressure transient behavior in naturally fractured reservoirs. (ERA citation 05:010025)

UCID-18292 PC **A02**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Interim Report: Biogeochemical Studies at the Geysers Geothermal Area.
J. J. Koranda. 12 Oct 79, 10p
Contract W-7405-ENG-48

Field research at the Geysers Geothermal Area directed toward quantifying the deposition of trace elements known to be contained in the cooling tower drift is described briefly. Results from meteorological measurements, particle filtration, gas analysis of air, and a program of coordinated ecological measurements made at Unit 12 are listed. (ERA citation 05:010018)

UCID-18488 PC **A03**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Assessment of the Injectability of Conditioned Brine Produced by a Reaction Clarification: Gravity Filtration System in Operation at the Salton Sea Geothermal Field, Southern California.
L. B. Owen, E. Raber, C. Otto, R. Netherton, and R. Neurath. 28 Nov 79, 30p
Contract W-7405-ENG-48

A Demonstration Reaction Clarifier - Gravity Filtration System with a 1600 GPM throughput capability was in operation at the joint DOE-SDG and E-MAGMA test facility located in the Salton Sea Geothermal Field, southern California, during the summer of 1979. The system, which was designed to condition spent effluent from a 10 MWe-size geothermal power plant, removes supersaturated dissolved species and residual suspended solids from brine prior to subsurface brine disposal via injection wells. The post-processing chemical stability of conditioned effluents was established by means of anaerobic incubation tests at 90 exp 0 C. The effect of residual dissolved polymer, that might be used for the purpose of scale control in upstream power plant components on the efficiency of reaction clarification, was also evaluated. Membrane filtration and core tests were used to assess the injectability of processed brine. It was found that the clarifier-filter operational procedures and system design permitted oxygenation of the brine by air intrusion. This resulted in partial stabilization of dissolved silica and precipitation of oxides of iron. As a consequence, conditioned brine injectability was poor. However, elimination of the air intrusion problem would result in a substantial improvement in brine quality. Residual amounts of dissolved polyaminoethylene (20 ppm, by weight), a powerful antisilica precipitant, in brine was shown by means of bench-scale tests carried out at approx. 90 exp 0 C to improve the efficiency of the clarification process where the additive appears to function as a flocculant. (ERA citation 05:010019)

UCID-18524 PC **A03**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Proposed Operating Strategy for a Field MIS Oil Shale Retorting Experiment (RBOSC Retort O).
R. L. Braun, J. H. Campbell, D. R. McKenzie, J. H. Raley, and M. L. Gregg. Jan 80, 28p
Contract W-7405-ENG-48

A possible operating strategy for a field scale retort (similar to Retort 0) proposed by the Rio Blanco Oil Shale Company (RBOSC)) is discussed. This retorting strategy was developed based on model calculations, pilot retort experiments, and laboratory work carried out at LLL. From these calculations a set of operating conditions are derived that appear to give the best overall retort performance. A performance monitoring strategy is being developed based solely on the exit gas and oil composition. (ERA citation 05:011281)

UCRL-52783 PC **A05**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Geothermal Environmental Projects Publication List with Abstracts 1975-1978.
Y. E. Ricker, and L. R. Anspaugh. 15 May 79, 91p
Contract W-7405-ENG-48

This report contains 119 abstracts of publication resulting from or closely related to geothermal environmental projects conducted by the Environmental Sciences Division at Lawrence Livermore Laboratory. Publications are listed chronologically from 1975 through 1978. The main entries are numbered sequentially, and include the full citation, an abstract, and selected keywords. This section is followed by an author index, and a keyword index. (ERA citation 05:011761)

UCRL-82819 PC **A02**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Continental Drilling for Scientific Purposes Data Management Program.
N. W. Howard. 1979, 12p CONF-791156-2
Contract W-7405-ENG-48
Geological Society of America annual meeting, San Diego, CA, USA, 5 Nov 1979.

Lawrence Livermore Laboratory was funded by the Office of Basic Energy Sciences of the Department of Energy to support the establishment of a data and information unit on all DOE drilling activities, as a service for the entire scientific community. The effort is known as The Continental Drilling for Scientific Purposes Data Management Program. The primary concern at this time is the collection of data on basement structures and deep continental basins, thermal regimes of the crust, mineral resources, and earthquakes and faulting. Satisfactory investigation of all these topics is dependent on data from deep and, therefore, expensive holes. An information system for existing and proposed deep drilling projects should be useful both for investigations of the particular concerns noted above and for studies of the earth's crust in general. The data management program should promote the efficient use of limited funds for drilling deep holes. Given the knowledge of these deep holes, investigators may either use existing information, or propose experiments for planned holes that will - with perhaps only little extra expense compared with the cost of the hole - provide the data they need. The LLL program is intended to improve dissemination of information on scientifically interesting holes. The program is operational but still under development. Data management systems are being reviewed to ascertain the most useful system. Data are being supplied by many individuals knowledgeable about existing and planned deep holes - included among these individuals are members of the staff of the US Geological Survey. Output of data now in the system is available on request. 1 figure, 3 tables. (ERA citation 05:012318)

UCRL-83419 PC **A03**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.

Hydraulic Fracturing Near Interfaces.
R. J. Shaffer, M. E. Hanson, and G. D. Anderson. Sep 79, 33p CONF-800204-4
Contract W-7405-ENG-48
Energy-sources technology conference, New Orleans, LA, USA, 3 Feb 1980.

Theoretical and experimental studies are being conducted of pressure driven fractures near interfaces that separate differing materials. When a crack propagates in material A toward a well bonded interface at half the dilatational wave speed, there is an amplification in the likelihood of crack penetration into material B. This amplification increases as material A becomes stiffer relative to B. The stress intensity factor of the leading crack tip decreases as the crack approaches a stiffer material and increases as the crack approaches a more flexible material. Additionally, when existing cracks are present near the interface, the effects of the change in material properties are reduced. In equilibrium analyses with unbonded interfaces, where shear stresses are transmitted via friction, a decrease in the coefficient of friction reduces the likelihood of crack penetration into the adjacent material when both materials are identical; however, decreasing friction tends to draw the crack toward the interface. Friction coefficients and hydrofracture penetration characteristics were measured in Indiana limestone and Nugget sandstone. There is a least stress required across the interface for a hydrofracture to cross the interface; this stress depends on rock type, interface surface finish, and water content. (ERA citation 05:011270)

UCRL-83666 PC **A04**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Land-Use Conflicts in The Geysers-Calistoga KGRA: a Preliminary Study.
K. O'Banion, C. Hall, and K. Haven. 1 Dec 79, 67p
Contract W-7405-ENG-48

This preliminary study of potential land use conflicts of geothermal development in The Geysers region, one component of the LLL/LBL socioeconomic program, focuses on Lake County because it has most of the undeveloped resource and the least regulatory capability. The land resource is characterized in terms of its ecological, hydrological, agricultural, and recreational value; intrinsic natural hazards; and the adequacy of roads and utility systems and each factor is depicted on a map. Then those factors are analyzed for potential conflicts with both geothermal and urban development and the conflicts displayed on respective maps. A brief review of laws and methods germane to geothermal land-use regulation is included. (ERA citation 05:011750)

8J. Physical Oceanography

AD-A082 776/6 Not available NTIS
Saclant ASW Research Centre La Spezia (Italy)
The Steady State of the Step Structure in the Tyrrhenian Sea,
R. Molcard, and R. I. Tait. 1977, 17p Rept no. SACLANTCEN-SR-24
Availability: Pub. in 'A Voyage of Discovery', p221-233 1977 (No copies furnished by DTIC).

No abstract available.

AD-A082 898/8 PC **A02**/MF **A01**
Lamont-Doherty Geological Observatory Palisades NY
Diatom Biostratigraphy of Unit 2 (Tripoli) of the Neostratotype Messinian,
Lloyd H. Burckle. 1978, 14p Rept no. LDGO-2827
Contract N00014-75-C-0210, Grant NSF-OCE75-18136
Pub. in Rivista Italiana di Paleontologia, v84 n4 p1037-1050 1978. Sponsored in part by Grant NSF-OCE76-18049.

No abstract available.

AD-A082 984/6 PC **A03**/MF **A01**
Naval Ocean Research and Development Activity NSTL Station MS
Sound Speed and Oceanic Frontal Variability in the Western Alboran Sea (January-March 1979).
Technical note,
Don F. Fenner. Sep 79, 42p Rept no. NORDA-TN-52

During January through March 1979, a Fleet-oriented exercise was conducted in the western Alboran Basin of the Mediterranean Sea (west of about 3 deg 30 min W). This report documents the oceanographic conditions that occurred during the exercise in terms of sound speed variability (both temporal and spatial) and the position of the Alboran Front, the major oceanographic feature of the western Alboran Sea.

PB80-168123 Not available NTIS
Texas A and M Univ., College Station. Dept. of Oceanography.
Oceanography. Review of Marine Geochemistry,
D. R. Schink. Oct 79, 29p NSF/IDOE-80-9
Grant NSF-OCE77-21009
Pub. in Journal of Reviews of Geophysics and Space Physics, v17, n7, p1447-1473, Oct 79.

The past four years have seen exciting progress in several areas in marine geochemistry and significant advances in many others. The data derived from the GEOSECS program have been particularly valuable; Coastal Upwelling (CUEA) and Manganese Nodule (MANOPS) programs are producing significant gains in our studies of the chemistry of the ocean. Deep Sea Drilling (DSDP) and the CLIMAP program also have significantly extended our understanding of how the earth was and how it works. Increasing attention has been given to the threat of a substantial change in climate caused by the release of fossil fuel CO_2 to the atmosphere.

8K. Seismology

AD-A082 458/1 PC **A03**/MF **A01**
Air Force Geophysics Lab Hanscom AFB Ma
Seismic Hazards Estimation Study for Vandenberg AFB.
Air Force surveys in geophysics,
James C. Battis. 14 Nov 79, 35p Rept nos. AFGL-TR-79-0277, AFGL-AFSG-418

The seismic hazard at Vandenberg AFB was investigated using both statistical analysis of the temporal and spatial distribution of historic earthquake activity within 500 km of Point Arguello, California, and deterministic methods based on knowledge of earthquake faults and recency of faulting near the installation. The results of these studies included probabilistic estimates of peak ground motions and maximum credible ground motions at Vandenberg AFB. This information was used to generate horizontal design response spectra which are more directly applicable for the analysis of the behavior of engineering structures to earthquake induced motions. (Author)

AD-A082 615/6 PC **A03**/MF **A01**
Massachusetts Inst of Tech Lexington Lincoln Lab
Seismic Discrimination.
Semiannual technical summary rept. 1 Apr-30 Sep 79,
Michael A. Chinnery. 30 Sep 79, 40p ESD-TR-79-247
Contract F19628-78-C-0002, ARPA Order-512

Lincoln Laboratory is continuing the task of carrying out the design and specification of a Seismic Data Center which will fulfill U.S. obligations that may be incurred under a possible future Comprehensive Test Ban Treaty. This report includes 9 contributions, summarizing progress in the Data Center design and associated seismic research. These contributions are grouped as follows: Seismic Data Center (3 studies), analysis of Seismic Research Observatory data (3 studies), and general seismology (3 studies).

IDO-78-1701.a.3 PC **A07**/MF **A01**
Utah Univ., Salt Lake City. Dept. of Geology and Geophysics.
Interpretation of a Seismic Refraction Profile Across the Roosevelt Hot Springs, Utah and Vicinity.
R. C. Gertson, and R. B. Smith. Mar 79, 129p
Contract EG-78-C-07-1701

In April 1977, a seismic refraction profile was recorded across the Milford Valley, the Roosevelt Hot Springs KGRA, and the northern Mineral Mountains in southwestern Utah. Seven shot points were used to provide multiple subsurface seismic refraction coverage along the 30 km east-west profile line. Since an inspection of power spectrums revealed large components of 60 Hz noise on some traces, computer routines were used to low-pass filter all seismograms. Amplitude information was utilized by normalizing all traces that recorded the same blast. Subsurface structural modeling was conducted by means of first arrival P-wave delay-time analysis and ray tracing. Herglotz-Wiechert travel-time inversion was used for the velocity-depth distribution in the Mineral Mountains. The interpretation of the P-wave traveltimes suggests that the Milford Valley fill consists of two units with a total thickness of at least 1.8 km. In the vicinity of the Roosevelt KGRA, a thin low velocity alluvial layer covers a basement igneous complex with a velocity of 5.2 km/s. Granite velocities between 3.3 km/s and 4.0 km/s were calculated from the travel-times in the Mineral Mountains. (ERA citation 05:010010)

LBL-10139 PC **A02**/MF **A01**
California Univ., Berkeley. Lawrence Berkeley Lab.
Statistical Analysis of the Correlation of Earthquakes with Radon Concentration in Water from Shallow Wells Near Oroville, California.
B. Berlin. Apr 79, 9p
Contract W-7405-ENG-48

This work is part of an investigation to determine whether a statistical relationship exists between varying radon concentration in well waters and the occurrence of nearby earthquakes. If such a dependence is verified, then certain patterns of changing radon activity may be useful for predicting earthquakes. Radon concentration in two water wells near Oroville, California, the Prosise and the Gilley wells, were compared with periodic aftershocks of the August 1, 1975, Oroville earthquake for a period of about 600 days. The data are consistent with data being generated from a distribution of either all noise; or long-term seismic fluctuations correlated with changes in the Prosise well, or short-term seismic fluctuations with changes in the Gilley well, or both. In both cases, the dependence must be expressed with different equations in different directions from the wells. Also, the data are inconsistent with data being generated from a distribution where the dependence between seismic activity and radon activity is very strong in all directions. 6 figures. (ERA citation 05:010694)

PB80-169196 PC **A14**/MF **A01**
California Inst. of Tech., Pasadena. Earthquake Engineering Research Lab.
A Selection of Important Strong Motion Earthquake Records,
David M. Lee, Paul C. Jennings, and George W. Housner. Jan 80, 311p EERL-80-01, NSF/RA-800021
Grant NSF-PFR77-23687

This report comprises a collection of data on 45 strong and/or historically important earthquake-generated ground and building motions. These data are presented as accelerogram and integrated velocity and displacement time histories. Linear, absolute acceleration, relative velocity, and relative displacement response spectra are given for all the ground motions presented. Since a major aim was to allow comparisons of different ground motions, the time history and response spectra plots were plotted, wherever possible, to fixed vertical and horizontal scales. A short introduction is given to earthquake recording instruments and recording networks using these devices. The sources from which the data in this report were drawn are identified and information given to enable one to obtain printed copies or magnetic tape copies of these data or any of the other earthquake data recorded in the U.S.

PNL-2893 PC **A04**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Seismic Data Catalog and Associated Graphical Capabilities.
T. N. Bishop, H. P. Foote, and S. C. Blair. Nov 79, 55p

Contract EY-76-C-06-1830

To facilitate the use of the enormous amount of earthquake data presently available, Pacific Northwest Laboratory (PNL) formed an extensive data base of compiled seismic data. PNL also developed many useful and unique computer techniques for analysis and display of the data. These techniques could be used in many areas of the United States to support nuclear waste management and other energy-related activities. Software associated with the data base includes programs for editing earthquake files; sorting files with respect to time, location, or magnitude; selecting data by use of various parameters; and merging files. These techniques allow the rapid formation of data files that are tailored to specific interests. The desired file may then be listed or displayed graphically by means of PNL's diversified graphic capability. From the data analysis software, an accurate and comprehensive earthquake catalog for the Pacific Northwest was created. This catalog was produced by merging data from many sources and includes microearthquake data. Duplicate events were eliminated, while all information available for a particular event was retained. Graphic displays can plot two- and three-dimensional epicenter or hypocenter information. Magnitude and/or depth information can be represented on two-dimensional plots by using color or symbol size. Plots can be produced using a variety of map projections and at a specified scale. This capability allows the use of any desired map as a base map for the display of earthquake data. Additional information such as rivers, coastlines, faults, and boundaries may also be included on the plots. Data may also be displayed using normal or two-dimensional histograms. 19 figures, 7 tables. (ERA citation 05:010695)

SAND-79-1633 PC **A03**/MF **A01**
Sandia Labs., Albuquerque, NM.
Applications of the Coherence Function in Comparing Seismometers.
S. D. Stearns. Dec 79, 33p
Contract EY-76-C-04-0789

A study is reported on the coherence function and its applicability in comparing two seismometers. Such comparisons are made to determine how much of the seismometer outputs consist of true earth motion as opposed to internal noise. The purposes of this report are: (1) to provide a descriptive discussion of the coherence function and related functions; (2) to show that the standard method of computing coherence can give misleading results; (3) to present the results of a study of methods for unbiasing the coherence estimate; and (4) to present a preferred scheme for computing coherence. Two examples using real data are included. (ERA citation 05:012389)

8L. Snow, Ice, and Permafrost

AD-A082 485/4 PC **A03**/MF **A01**
Lamont-Doherty Geological Observatory Palisades NY
Oceanic Evidence for the Mechanism of Rapid Northern Hemisphere Glaciation.
Journal article,
W. F. Ruddiman, A. McIntyre, V. Niebler-Hunt, and J. T. Durazzi. 8 Nov 78, 32p Rept no. LDGO-2873
Contract N00014-75-C-0210, Grant NSF-OCE76-21075
Pub. in Quaternary Research, v13 p33-64 1980. Sponsored in part by Grant NSF-OCE76-18049.

No abstract available.

AD-A082 745/1 PC **A05**/MF **A01**
Alaska Univ Fairbanks Inst of Marine Science
Gases in Sea Ice 1975 - 1979.
Final rept.,
John J. Kelley, and Thomas A. Gosink. Sep 79, 95p
Contract N00014-76-C-0331

Although this research was concerned with several trace gases, carbon dioxide was of primary concern. The arctic and subarctic regions represent nearly 10% of the northern hemispheric surface, half of which is Arctic Ocean and tundra. Global atmospheric diffusion models for CO2 are not entirely satisfactory for the arctic where winter-summer differences in CO2 concentration are the largest in the world. There is a substantial amount of data on measured atmospheric CO2 levels of the arctic environment, but there is a significant lack of information for sources and sinks, particularly with respect to seasonal and geographic rates of exchange. Annual sea ice and frozen tundra are not sealed media, but evolve significant quantities of carbon dioxide throughout the winter. The high latitude arctic region is found to be a significant net annual source of carbon dioxide to the atmosphere. Annual sea ice permeable to gases because of its brine content, that it is enriched in some of these trace gases, that it outgases throughout the winter, and that for periods of time it controls tropospheric concentrations for some of these gases. We have also observed and reported similar effects for the tundra for both summer and winter conditions. Copies of recent technical papers submitted for publication are appended.

AD-A083 015/8 PC **E19**/MF **E19**
Cold Regions Research and Engineering Lab Hanover NH
Bibliography on Cold Regions Science and Technology. Cumulative Author Index. Volumes 28-32, Cumulative Subject Index. Volumes 28-32, Parts 1 and 2,
Geza T. Thuronyi. Dec 78, 1919p
Supersedes AD-A007 105, AD-A022 641, AD-A043 461 and AD-A063 687. See also Volumes 23-27, AD-A022 642.

This index is a cumulation of the annual indexes to five volumes of the Bibliography on Cold Regions Science and Technology (28-32). In anticipation of this cumulation (and the companion Subject Index) the annual indexes have been bound separately rather than with the bibliography volumes, so they now may be discarded. The index is arranged alphabetically by author. All principal and joint authors are included, both personal and corporate. Anonymous articles are listed under their titles.

AD-A083 016/6 PC **E08**/MF **E08**
Cold Regions Research and Engineering Lab Hanover NH
Bibliography on Cold Regions Science and Technology. Volume 30, Part 1,
Geza T. Thuronyi. Dec 76, 338p
See also AD-A083 015.

The present volume contains material accessioned between July 1975 and September 1976. The volume contains the full citation of 4635 items, in many cases with abstracts.

AD-A083 017/4 PC **E12**/MF **E12**
Cold Regions Research and Engineering Lab Hanover NH
Bibliography on Cold Regions Science and Technology. Volume 32,
Geza T. Thuronyi. Dec 78, 467p
See also Volume 30, Part 1, AD-A083 016.

The present volume contains material accessioned between October 1977 and september 1978. It contains the full citation of 4772 items, in may cases with abstracts. Indexing for the volume is included in a cumulative author and subject index covering volumes 28-32 of the bibliography (published December 1978).

8M. Soil Mechanics

AD-A082 573/7 Not available NTIS
Washington Univ Seattle
Heave of Silty Sands,
Mehmet A. Sherif, Isao Ishibashi, and Wing-Wai Ding. 4 Jun 76, 13p ARO-12913.10-GS
Grant DAAG29-76-G-0056
Availability: Pub. in Jnl. of the Geotechnical Engineering Division, v103 nGT3 p185-195 Mar 77 (No copies furnished by DTIC).

No abstract available.

AD-A082 733/7 PC **A04**/MF **A01**
Dames and Moore London (England)
Constitutive Laws for Dynamic Modelling of Soils,
J. Marti, and Peter A. Cundall. Jan 80, 70p
EOARD-TR-80-7
Contract F61708-79-M-0871

Soils are composed of a combination of solid particles, water, and often, air. The constitutive behavior of water and air are fairly well understood. Attention in this study is given only to the mechanical behavior of the soil skeleton under isothermal conditions. Characteristics which should be displayed by any soil models used under generalized loading conditions are enumerated. A summary of existing models are discussed--Elastic and Viscoelastic Models, One-Dimensional Curve Fits, Ideal Elasto-Plasticity, Elastic Non-Ideally Plastic Models, Endochronic Models, The Failure-Seeking Model, as well as comparison of existing models with desired features. Recommended lines for advancement in generating a more universal model are also included. (Author)

AD-A082 874/9 PC **A06**/MF **A01**
Battelle Columbus Labs OH
Evaluation of the Environmental Fate of Munition Compounds in Soil.
Final rept. 30 Jun 76-31 Mar 78,
Verle Q. Hale, Thomas B. Stanford, and Lee G. Taft. Jun 79, 108p
Contract DAMD17-76-C-6065

A study was conducted to monitor the downward movement of Tetryl (N-methyl-N,2,4,6-tetranitroaniline), RDX (Hexahydro-1,3,5-trinitro-1,3,5-triazine), and TNT (2,4,6-trinitrotoluene) and their transformation products through intact soil columns. Periodic soil water samples were taken by applying vacuum to ceramic cup sampling tubes installed at depths of 6, 18, 30 and 60 inches (15, 46, 76, and 152 cm). Periodic soil samples were taken at selected intervals in the soil profiles with an Oakfield sampler. The water and soil samples were analyzed for the munition compounds and their known transformation products. These studies were continued for a period of 6 months. Results showed very little detectable movement of the munition compounds or their known transformation products in this time frame. These compounds were detectable by HPLC as low as 50 ppb, but the areas under the curves of the graphs were too small to be reliably measured below 200 ppb. Separate studies indicated that this may be the combined result of soil fixation and limited water solubilities of the munition compounds.

9. ELECTRONICS AND ELECTRICAL ENGINEERING

9A. Components

AD-A082 503/4 PC **A07**/MF **A01**
Naval Underwater Systems Center New London CT New London Lab
Handbook for the Analysis of Piezoelectric Transducers (Using Electrical Equivalent Circuits). Part I. The Untuned Transducer.
Technology monographs no. 1,
Harry B. Miller. 14 Sep 78, 132p Rept no. NUSC-TD-6029-PT-1

This handbook is based on approaches which have been useful to the author. These approaches do not always conform to a 'standard treatment' of the subject. For example, the literature contains many analyses based on the impedance circle diagram and the admittance circle diagram, which comprise offset 'circles' in the complex plane. Here Y or Z is given as A + jB. The author has for the most part used an alternative approach, by extracting the two components of (A + jB) from the complex plane and plotting them separately in the real plane, versus frequency. Eventually the interrelationship is shown between the plots in the real plane and the plots in the complex plane. The handbook thus presents the reader with a choice of ways of analyzing transducers. A situation constantly imagined was: If you are handed, e.g., an old impedance-vs-frequency curve, unearthed in a file, what is the maximum amount of information you can extract from it. One aim of this handbook is to help the reader maximize the obtainable information. (A well-documented circle diagram contains everything you need; but too often the frequencies desired by the next inquirer are not called out. Hence the diagram loses its value).

AD-A082 539/8 PC **A02**/MF **A01**
Rockwell International Anaheim CA Electronics Research Center
Epitaxial Garnets and Hexagonal Ferrites.
Final rept. 15 Jan 79-14 Jan 80,
Howard L. Glass. 28 Feb 80, 7p C80-149/501, AFOSR-TR-80-0227
Contract F49620-79-C-0048
Continuation of Contract F44620-75-C-0045.

The objective of this research is to develop new and improved epitaxial ferrite materials for use in microwave and millimeter-wave signal processing devices. The major emphasis has been on multiple layer epitaxial garnet structures for magnetostatic wave delay lines. Theoretical analysis was made for magnetostatic surface wave and magnetostatic forward volume wave propagation in structures containing two or three different magnetic garnet layers. Two-layer structures were prepared by liquid phase epitaxy using yttrium iron garnet as a high magnetization layer and lanthanum-gallium substituted yttrium iron garnet as a lower magnetization layer. Measurements of magnetostatic wave propagation at frequencies in the 1 GHz to 6 GHz range were generally in good agreement with the theory. For magnetostatic surface waves, nondispersive delays of approximately 200 MHz bandwidth at a center frequency of 3 GHz are obtainable. Delay time can be varied from about 50 nsec/cm to 120 nsec/cm by choice of the layer thickness and magnetization. For magnetostatic forward volume waves, it appears to be possible to obtain 1 GHz bandwidths in linearly dispersive delay lines operating at X-band.

AD-A082 677/6 PC **A02**/MF **A01**
Stanford Univ CA Inst for Plasma Research
Noise in Planar Crossed-Field Electron Guns. I. Theory,
Kenneth J. Harker, and Frederick W. Crawford. 30 Jun 78, 12p SU-IPR-746, AFOSR-TR-80-0110
Grant AFOSR-77-3306
Pub. in IEEE Transactions on Electron Physics, vED-26 n10 p1623-1633 Oct 79. See also AD-A082 678.

No abstract available.

AD-A082 678/4 PC **A02**/MF **A01**
Stanford Univ CA Inst for Plasma Research
Noise in Planar Crossed-Field Electron Guns. II. Numerical Solution,
Kenneth J. Harker, and Frederick W. Crawford. 4 Apr 79, 9p AFOSR-TR-80-0109
Grant AFOSR-77-3306
Pub. in IEEE Transactions on Electron Devices, vED-26 n10 p1634-1640 Oct 79. See also AD-A082 677.

No abstract available.

AD-A082 734/5 PC **A02**/MF **A01**
Sandia Labs Albuquerque NM
Response of a Terminated Transmission Line Excited by a Plane Wave Field for Arbitrary Angles of Incidence,
Charles W. Harrison, Jr., and Clayborne D. Taylor. Oct 72, 12p Rept no. SC-RR-72-0560

An analysis to determine the response of an impedance-loaded transmission line configuration excited by a plane-polarized electric field of arbitrary spatial orientation has been needed for a long time. The purpose of the present paper is to meet this need by suggesting a method of solution based on the analysis of the simplest of such circuits: an impedance - terminated two-conductor transmission line. (Author)

AD-A082 928/3 PC **A04**/MF **A01**
Mission Research Corp Albuquerque NM
Two-Port Representation of a Linear Transmission Line in the Time Domain.
Final rept.,
H. J. Price, R. H. St. John, and D. E. Merewether. Jan 80, 69p AMRC-R-170, AFWL-TR-79-18
Contract F29601-77-C-0020

This report discusses the adaptation of a linear section transmission line to a time-domain code. The linear section is described by frequency-domain parameters appropriately transformed into the time domain. On both ends of the linear section, the time-domain code employs difference equations to describe regions which may exhibit a nonlinear response. The interface between the linear and potentially nonlinear sections of cable produce boundary conditions joining the variant mathematical descriptions of the regions. This document reports on the formulation (in the time domain) of a two-part representation for a linear transmission line, and the joining of this result to a nonlinear, time-domain, transmission-line code. In general, the nonlinearities can occur in two regions: The first, or primary breakdown region, close to the burst, results from the high intensity fields associated with the nuclear device. The second, or secondary breakdown region, can occur at a discontinuity in the line far from the area of detonation. These are caused by signals propagated by the line and reflected at the discontinuity. These two regions are separated by a linear section of cable. Of course, this central line section is quite compatible with the nonlinear codes; that is, the difference equations representing the transmission-line equations are compatible with linear, as well as nonlinear, line behavior.

AD-A082 965/5 PC **A03**/MF **A01**
David W Taylor Naval Ship Research and Development Center Bethesda MD
Piezoelectric Finite Elements for NASTRAN.
Final rept. Jun-Sep 79,
Robert R. Lipman, and Myles M. Hurwitz. Apr 80, 32p Rept no. DTNSRDC-80/045

The NASTRAN structural analysis program has been modified so that its TRAPAX and TRIAAX finite elements may handle piezoelectric material properties. These elements are solid, axisymmetric ring elements capable of handling non-axisymmetric loads. The natural frequencies of a piezoelectric hollow cylinder and a piezoelectric disk with electroded surfaces were computed with this modified version of NASTRAM and were found to be in excellent agreement with experimental and other numerical results. (Author)

AD-A083 037/2 PC **E20**
IIT Research Inst Rome NY
Discrete Semiconductor Reliability Transistor/Diode Data, Winter 79/80,
Joseph Vincent Beasock. 1980, 417p RAC-DSR-3
Contract F30602-78-C-0281

This Discrete Semiconductor Reliability compendium contains failure rates on transistors and diodes from actual field use conditions, in-house checkout and reliability tests performed at the equipment level. Generic part-type failure rate summaries and a reliability data tabulation by E.I.A.-registered part number are presented. The failures reported are described in a separate section which includes detailed failure analysis information.

BNL-26950 PC **A02**/MF **A01**
Brookhaven National Lab., Upton, NY.
Effects of Differential Thermal Contraction Between the Matrix and the Filaments in Mono- and Multifilamentary Nb sub 3 Sn on the Superconducting Critical Temperature.
K. Aihara, M. Suenage, and T. Luhman. 1979, 6p CONF-791102-83
Contract EY-76-C-02-0016
Symposium on engineering problems of fusion research, San Francisco, CA, USA, 13 Nov 1979.

The strain on Nb sub 3 Sn due to the differential thermal contraction between the matrix (Cu, bronze) and the filaments (Nb, Nb sub 3 Sn, Ta) of a superconducting wire is known to decrease the superconducting critical temperature T/sub c/. In order to study the effects of heat treatment conditions and filament size on the degradation of T/sub c/ by the strain. T/sub c/ for monofilamentary wires ((Nb sub 3 Sn and bronze in Ta) in Cu matrix, and (bronze in Nb tubings) in Cu matrix) were measured for heat-treating periods in of 1 to 120 h at 725 exp 0 C. Several observations were made regarding the effects on T/sub c/ of thermal contraction strains from various components of the conductors. The influence of a Cu matrix on T/sub c/ was small (approx. 0.2 K). When the bronze matrix was inside Nb tubing the degradation of T/sub c/ due to strains was substantially larger than when the Nb filaments were in a bronze. Wires with smaller filament diameters achieved a maximum T/sub c/ in shorter heat treatment times than those with larger filaments. These results are discussed in terms of the critical currents of these wires under applied tensile strains. (ERA citation 05:010341)

BNL-26989 PC **A02**/MF **A01**
Brookhaven National Lab., Upton, NY.
Analysis of Critical Current-Bend Strain Relationships in Composite Nb sub 3 Sn Superconducting Wires.
T. Luhman, and D. O. Welch. 1979, 5p CONF-791102-86
Contract EY-76-C-02-0016
Symposium on engineering problems of fusion research, San Francisco, CA, USA, 13 Nov 1979.

In order to be used successfully in fusion magnets, Nb sub 3 Sn conductors must meet several mechanical strain criteria, including tolerance to bending strains encountered during magnet construction. Since Nb sub 3 Sn is extremely brittle much information has been generated regarding the sensitivity of these conductros to tensile strain. A recent comparison of critical current-bend and tensile test data indicates that the strain required to initiate compound cracking during bending is significantly less than the strain required to do so by tensile of critical current on bending strains in monofilamentary Nb sub 3 Sn wires is calculated and compared with experimental data. The calculation takes into account a shift in the composite's neutral axis which occurs during bending. The analysis correctly predicts the observed depdndence of the critical current on bending strains. (ERA citation 05:010335)

K-2012 PC **A02**/MF **A01**
Oak Ridge Gaseous Diffusion Plant, TN.
In-Situ Analysis for Volatile Constituents in 14.7 KV Power Cable by Purge and Trap.
M. S. Miller, R. W. Morrow, C. C. Wright, and T. R. Oldham. 21 Dec 79, 20p
Contract W-7405-ENG-26

A nondestructive in-situ analytical method to detect sulfur vulcanized rubber fillers in installed 15 kV power cables is described. The sulfur rubber fillers are corrosive to copper cable shielding rendering the power cables unfit for intended use. The analytical methodology involves purging the interstitial cable gases through a series of cryogenic traps and subsequent analyses by gas chromatography/mass spectrometry (GC/MS) or by direct gas mass spectrometry. A compound indicative of sulfur rubber fillers has been identified as carbonyl sulfide (COS). Pertinent sampling and analytical procedures are described and supportive analytical data are given. (ERA citation 05:013947)

LBL-9927 PC **A02**/MF **A01**
California Univ., Berkeley. Lawrence Berkeley Lab.
Microstructural Characterization of Rare Earth-Cobalt Magnets.
R. K. Mishra, and G. Thomas. Oct 79, 15p CONF-7905127-1
Contract W-7405-ENG-48
International workshop on rare-earth cobalt magnets, Hakone, Japan, May 1979.

Structural faults and phase transformations in R sub 2 -Co sub 17 magnets are studied using transmission electron microscopy. The magnetization mechanism in a step aged Sm (Co, Fe, Cu, Zr) alloy is determined to be by domain wall pinning in the 1:5 phase of the cellular microstructure. Limitations of the electron metallography technique to study these materials are pointed out. (ERA citation 05:009482)

ORNL/TM-7173 PC **A07**/MF **A01**
Oak Ridge National Lab., TN.
High Voltage Research (Breakdown Strengths of Gaseous and Liquid Insulators) and Environmental Effects of Dielectric Gases. Semiannual Report, April 1, 1979-September 30, 1979.
L. G. Christophorou, D. R. James, R. Y. Pai, R. A. Mathis, and I. Sauers. Jan 80, 128p
Contract W-7405-ENG-26

A number of gas mixtures are suggested for industrial-scale testing. Electron attachment rates were measured and unfolded to give attachment cross section functions for CCl sub 3 F, CCl sub 2 F sub 2 , and CClF sub 3 each in N sub 2 , and for CCl

sub 3 F in Ar. Electron attachment rates were measured also for n-C sub 6 F sub 14 in both Ar and N sub 2 . The effects of molecular structure on energy, cross section, and lifetime of negative ion states of organic molecules were considered. A study was made of the potential role of electron detachment in breakdown. The role of dipolar scattering of electrons in inhibiting breakdown was investigated. The nature of synergisms among constituents of a gas dielectric mixture is discussed. Examples are cited from recent breakdown measurements. Breakdown measurements in plane-plane geometry were made for CF sub 4 , 1,1,1-CH sub 3 CF sub 3 , and CHF sub 3 . Similar measurements were conducted with binary mixtures containing one of (c-C sub 4 F sub 8 , SF sub 6) and one of (CF sub 4 , CH sub 2 F sub 2 , 1,1,1-CH sub 3 CF sub 3 , CH sub 2 F sub 2). Of special interest in these results were observed synergisms and the effect of dipole moment on the breakdown strengths. The initial fragmentation of 1,1,2-C sub 2 Cl sub 3 F sub 3 under electron impact was studied. Final decomposition products of sparked SF sub 6 /2-C sub 4 F sub 6 mixtures were identified and quantified. The breakdown products of SF sub 6 were studied. Impulse measurements concentrated on c-C sub 4 F sub 8 /SF sub 6 mixtures. Values of V sub 50 , V/sub NO/, and V/sub 10x/ were obtained and evaluated. In the practical conditions of cylindrical geometry with and without surface roughness, many multicomponent mixtures of the gases SF sub 6 , c-C sub 4 F sub 8 , 2-C sub 4 F sub 8 , N sub 2 , and 1,1,1-CH sub 3 CF sub 3 were tested, at both 1 and 4.4 atmospheres. The electric fields were calculated. In the study of liquid dielectrics n-hexane and perfluoro-n-hexane were tested. 35 figures, 20 tables. (ERA citation 05:012213)

PAT-APPL-6-027 439 PC **A02**/MF **A01**
Department of Energy, Washington, DC.
Method of Preparing High-Temperature-Stable Thin-Film Resistors.
Patent Application,
L. S. Raymond. Filed 5 Apr 79, 10p
Contract EY-76-S-02-4081
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A method of preparing composite, high-temperature-stable, thin-film resistors by chemical vapor deposition is disclosed. The resistor film of tungsten-silicon is formed from gaseous decomposable compounds of tungsten and silicon. The bulk resistivity of the film can be controlled and reproduced and the temperature coefficient of resistivity can be controlled over a range of values by process parameter variation. (ERA citation 05:018788)

PAT-APPL-6-088 906 PC **A02**/MF **A01**
Department of the Army Washington DC
Triggered High Current Opening Switch.
Patent Application,
James D. Holder. Filed 29 Oct 79, 5p AD-D007 108/4
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

This invention describes a means by which electric current of values up to many thousands of amps may be made to cease flowing at a precisely controlled point in time. A fuseable link is inserted in series-connection in the circuit, and load current causes resistive heating to a temperature less than the melting point. At a selected time, energy from some external source (laser, capacitor, etc.) is introduced into the fuseable link which causes melting and a rapid transition of temperature and resistivity until explosive vaporization of the fuseable link takes place. At that point, the flow of current is blocked. (Author)

PAT-APPL-6-094 250 PC **A02**/MF **A01**
Department of the Navy Washington DC
Rare Earth-Iron Magnetostrictive Materials and Devices Using These Materials.
Patent Application,
George W. Byram. Filed 14 Nov 79, 20p AD-D007 138/1
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

Grain-oriented polycrystalline or almost single crystal magnetostrictive materials of the general formula TbxDy1-xFe(2-w)prim TbxHo1-xFe(2-w)prim SmxDY1-xFe(x-w)prim SmxHo1-xFe(2-w)prim TbxHoYDYzFe(2-w)prim or SmxHoY-DYZFe(2-w)prim wherein 0 less than or equal w less than or equal 0.20, and x + y + z =1. X, Y, and z are selected to maximize the magnetostrictive effect and the magnetomechanical coupling coefficient K33. These material may be used in magnetostrictive transducers, delay lines, variable frequency resonators, and filters. (Author)

PAT-APPL-6-101 344 PC **A02**/MF **A01**
Department of the Army Washington DC
Fluidic Wetted Slip Range.
Patent Application,
Thomas H. Howell. Filed 7 Dec 79, 6p AD-D007 102/7
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

This document describes a slip ring assembly including a housing containing a fluidic conductive source such as mercury. A rotating shaft extends through the housing and is provided with electrical conductors thereon which are immersed in the mercury during shaft rotation. A pair of conductive plates is carried in the mercury and electrical leads extend from the conductive plates and out of the housing. (Author)

PAT-APPL-6-126 772 PC **A02**/MF **A01**
Department of the Navy Washington DC
Underwater-Mateable Electrical Connector.
Patent Application,
Jeffrey V. Wilson, and Leroy W. Tucker. Filed 3 Mar 80, 16p AD-D007 147/2
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

In an underwater-mateable connector system of the vented pin-and-socket type, the socket electrical contact system is composed of a contact ring cooperating with a contact band, the contact band being integrally provided with a multiplicity of resiliently deformable louvers. The pin electrical contact is composed of a rigid conductor disposed intermediate electrically-insulating material and is arranged to provide electrical contact with the deformable louvers of the contact band. Electrically insulating interference seals are formed on either side of the contact area when mated due to differential diameters between the pin and socket. The preferred embodiment utilizes a Multilam band (U.S. Patent 3,453,587) as the contact band. (Author)

PAT-APPL-6-127 017 PC **A02**/MF **A01**
Department of the Air Force Washington DC
Method of Making Integrated Waveguide Cavities.
Patent Application,
Chento Chao. Filed 4 Mar 80, 7p AD-D007 130/8
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

This invention provides a method for forming a waveguide cavity as a step in the process of diode fabrication. Semiconductor diodes are formed in a conventional manner. A plate of waveguide material having a thickness equivalent to waveguide height and slots corresponding to waveguide width is bonded to a semiconductor wafer containing a number of diodes. The slots are formed to correspond to rows of diodes, so that when bonded the diodes are centered in the slot. The package may then be divided as needed and the sides and thickness of the slot form the waveguide. (Author)

PAT-APPL-6-129 300 PC **A02**/MF **A01**
Department of the Navy Washington DC
Waveguide Coupler.
Patent Application,
Larry R. Barnett. Filed 11 Mar 80, 16p AD-D007 074/8
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

The rectangular waveguide to circular waveguide coupler includes a first section of circular waveguide spaced by a gap from a reflective-plane conducting wall, the latter having a hole for passage of an electron beam if the coupler is used in a traveling wave tube, and a second section of circular waveguide disposed external to, and coaxial with, at least a portion of the first waveguide section and extending to the wall to provide a conductive boundary surrounding the gap. The region between the first and second waveguide sections forms an input port of the coupler; the first waveguide section forms the output port of the coupler. Electromagnetic waves in a TE(01) coaxial waveguide mode are applied to the input port from a rectangular waveguide supporting the dominant TE(10) mode. The second waveguide section has a cutoff determining dimension r(e) proportioned to support both the TE(01) and TE(02) circular electric modes in the region of the gap at the frequency of the applied waves. The first waveguide section has cut-off determining dimensions r(i) proportioned to support the circular electric TE(01) mode to the exclusion of all higher-numbered circular electric modes at the frequency of the applied waves.

PAT-APPL-6-129 792 PC **A02**/MF **A01**
Department of the Navy Washington DC
Wide-Band Varactor-Tuned Gunn Oscillator.
Patent Application,
John W. Amoss. Filed 12 Mar 80, 11p AD-D007 073/0
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

The present invention relates generally to voltage-tuned oscillators and, more particularly, to a wide-band varactor-tuned microwave Gunn oscillator. Conventional varactor-tuned microwave Gunn oscillator circuits are of microstrip, stripline, coaxial, or waveguide construction in which the biasing and matching is carried out using distributed-type elements. These distributed-type elements are a combination of transmission lines of various impedances whose lengths are appreciable compared to a wavelength at some frequency within the tuning range, typically a quarter wavelength, or multiples thereof, at the center frequency. In addition, conventional circuits utilize Gunn and varactor chips mounted in conventional microwave packages which introduce undesirable parasitic elements. It is generally recognized that distributed circuit elements and package parasitics critically affect the achievable tuning range of varactor-tuned microwave oscillators by reducing the maximum net reactance variation possible for a given change in varactor capacitance. For wide-band tuning, all parasitics must be minimized and the varactor chip must be tightly coupled to the active device and load with non-dispersive and non-distributed coupling elements.

PB80-165749 Not available NTIS
National Bureau of Standards, Washington, DC.
Technology of Semiconductor Manufacturing, Product Development and Product Types.
Final rept.,
R. I. Scace. 1979, 25p
Pub. in Journal Appendix in DIBA Pub., U.S. Semiconductor Industry, p105-129, Sep 79.

A presentation is made of the technological basis of the semiconductor industry, in non-technical terms. The materials, processes, and principal types of devices commonly encountered are described. Significant technical problems are briefly mentioned, as is the annual sales volume for the various kinds of products.

SAND-79-0211 PC **A03**/MF **A01**
Sandia Labs., Albuquerque, NM.
Evaluation of Pullout Cable EMR Hardware Design and Potting Methods.
R. S. Nelson, and R. R. S. Everett. Jan 80, 30p
Contract EY-76-C-04-0789

A continuing problem of undesirable voids in epoxy potting of pullout cable electromagnetic radiation (EMR) shields exists. Three new EMR shields with smooth inner contours were developed to minimize void formation caused by air entrapment near sharp corners. Prototype cable assemblies were fabricated with the new shields. The prototypes were filled with both aluminum oxide (Al sub 2 O sub 3) and beta eucryptite (Beta U) filled epoxies

using single- and two-stage potting methods. Results demonstrate that the new shields are effective but that the major cause of voids is due to the shrinkage of epoxy during cure. The shrinkage problem (3 percent by volume) is overcome by careful two-stage potting into shields designed so that the volume for the second stage potting is extremely small. (ERA citation 05:012380)

9B. Computers

AD-A082 428/4 PC **A04**/MF **A01**
Riverside Research Inst El Segundo CA
Satellite Infrared (SIRE) Sensor Data Processing Perspective and Definition. Volume II. Appendix A. Survey of Available IR Data Processing Options for SIRE.
Final rept. Apr-Dec 78,
Thomas Ciccarelli. 31 Dec 78, 60p RRI-F/387-7-55-VOL-2, SD-TR-79-23-VOL-2
Contract F04701-76-C-0258
See also Volume 3, AD-A082 429.

This appendix presents the results of a limited survey of commercial suppliers of image processing equipment and IR data reduction centers. The purposes of the survey were to assess the commercial availability of IR data processing hardware and software. Interest in manually interactive systems resulted from various SIRE data processing system configurations which could permit the evaluation, assessment, and partial analysis of SIRE data and the required status feedback to test planning in lieu of full, automated data analysis.

AD-A082 449/0 PC **A03**/MF **A01**
Texas Instruments Inc Dallas
An Analog CCD Reformatting Memory Employing Two-Dimensional Charge Transfer.
Interim rept.,
Robert J. Kansy. Dec 79, 35p RADC-TR-79-294
Contract F19628-77-C-0234

An analog DDC reformatting memory has been designed and fabricated using an N-channel double level polysilicon gate process. This unique CCD structure employs two-dimensional charge transfer cells in a 32x32 element array which is accessed by means of integrated CCD demultiplexer and multiplexer structures resulting in greater dynamic range than observed in previous line-addressed designs. The design and operation of this structure are discussed, and examples of application in signal processor architectures are described. (Author)

AD-A082 461/5 PC **A04**/MF **A01**
University of Southern California Marina Del Rey Information Sciences Inst
Microcode Verification Project.
Interim rept.,
Stephen D. Crocker, Leo Marcus, and Dono van-Mierop. Jan 80, 63p RADC-TR-79-353
Contract F30602-78-C-0008

The goal of the microcode verification project at ISI is the development of both the theory and tools for verification of microcode. The strategy has been to push the development of a working system, letting the theoretical issues and the human engineering questions emerge during system development. The ISPS language is used for encoding our machine descriptions. The State Delta formalism is used for reasoning about the course of the computation. A system to check proofs of microcode validity is currently built. The system is composed of a data base and simplifier that perform some automatic deductions to make checking of the proof-steps manageable, as well as a proof language and a user interface. A particular computer (the FTSC) is used to establish a focus for the project and to provide a source of examples. This document reports the results of verifying the microcode of the square root instruction of the FTSC, and the results of verifying the complete microcode of a much smaller fictitious example machine.

AD-A082 465/6 PC **A03**/MF **A01**
David W Taylor Naval Ship Research and Development Center Bethesda MD
DIGIT: The Curve Digitizing Subsystem of the Interactive Data Display System.
Final rept. Sep 77-Apr 79,
Mary Beth Marquardt. Mar 80, 49p Rept no. DTNSRDC-80/038

DIGIT is a high-performance interactive graphics program for use in extracting numerical data values (x,y-coordinates) from plots and drawings. It is a subsystem of the Interactive Data Display System (IDDS). In order to digitize, the user needs not only the program but also a digitizing tablet. IDDS, including DIGIT, is designed to run quickly and efficiently. Speed is obtained by minimizing the number of prompts.

AD-A082 545/5 PC **A02**/MF **A01**
Stanford Univ CA Stanford Electronics Labs
Design and Verification of Reliable Software.
Final rept. 1 Jan 77-31 Dec 79,
Susan S. Owicki. 29 Feb 80, 13p AFOSR-TR-80-0232
Contract F49620-77-C-0045

This research project is concerned with methods for developing provably correct concurrent programs. Two complementary approaches have been pursued. The first is the development of basic tools for describing and verifying concurrent interactions between system components. Specification and proof methods have been developed for both invariant properties and service guarantees of modular programs. They allow independent verification of each module, and provide a basis for reasoning about a wide class of concurrent systems. Statement and verification of service guarantees is made possible by using temporal logic, a logical system in which one can reason about the future states of a program computation.

AD-A082 547/1 PC **A03**/MF **A01**
Utah Univ Salt Lake City Dept of Mathematics
An Automatic Quadrature Algorithm Based on the Trapezoidal Formula,
J. Schwing, K. Sikorski, and F. Stenger. 22 Feb 80, 27p ARO-14864.7-M
Grant DAAG29-77-G-0139

The formulas that this subroutine (WNEW) is based on are most powerful when the integrand f does not have a singularity (a singularity is a point where df/dx does not exist) in the interior of the range of integration; however, singularities at endpoints of intervals are allowed. Indeed, it is in the cases where f has singularities at the end-points of the range of integration that the subroutine WNEW is superior to other subroutines.

AD-A082 680/0 PC **A02**/MF **A01**
Purdue Univ Lafayette IN School of Electrical Engineering
A Model of SIMD Machines and a Comparison of Various Interconnection Networks,
Howard Jay Siegel. 20 Aug 77, 13p AFOSR-TR-80-0112
Grants AFOSR-78-3581, NSF-DCR74-21939
Pub. in IEEE Transactions on Computers, vC-28 n12 p907-917 Dec 79.

No abstract available.

AD-A082 687/5 PC **A04**/MF **A01**
General Electric Co Arlington VA
Experimental Evaluation of On-Line Program Construction.
Technical rept. Mar 78-Feb 79,
Sylvia B. Sheppard, Phil Milliman, and Bill Curtis. Dec 79, 67p Rept no. TR-79-388100-6
Contract N00014-77-C-0158

An experiment was conducted to assess the utility of complexity metrics for the prediction of programmer performance in the construction of software. After practicing on a preliminary program, each of the nine participants developed three experimental programs on-line. An English language description of each problem was presented in addition to one of the following specification formats: program design language, tree chart, and both of these techniques. No significant differences were found in the times to construct programs from these different types of specification formats. The software complexity metrics developed by Halstead and McCabe were found to be significantly better predictors of the time to complete the program than the number of statements. (Author)

AD-A082 713/9 PC **A12**/MF **A01**
Planned Systems International Inc Cambridge MA
DMA Modern Programming Environment Study.
Final technical rept. Nov 78-May 79,
Leon Stucki, John Brown, and Linda Hammond. Jan 80, 258p RADC-TR-79-343
Contract F30602-79-C-0022

This study represents the first formal, rigorous approach to modernizing the DMA programming environment. This study produced a plan for upgrading the current software production practices at all DMA installations using modern software engineering tools and procedures. (Author)

AD-A082 725/3 PC **A04**/MF **A01**
Massachusetts Inst of Tech Lexington Lincoln Lab
A Distributed Processor Architecture for BMD Signal and Data Processing Applications.
Technical note,
Robert L. South, and Robert J. Purdy. 21 Dec 79, 59p TN-1979-84, ESD-TR-79-301
Contract F19628-80-C-0002

The signal processor in large Ballistic Missile Defense (BMD) systems includes a subsystem, known as the Post Processor, which selectively reduces the received data to rates which are appropriate for the subsequent general purpose Data Processing System. This report presents an analysis of the processing requirements for the Post Processor and describes a multiprocessor, multibus architecture which appears well matched to the processing and throughput requirements. (Author)

AD-A082 732/9 PC **A10**/MF **A01**
Westinghouse Word Processing Center Pittsburgh PA
Primer on Computer Graphics Programming.
Final rept.,
Richard Puk, Steve Orbon, Robert Bruns, and James M. Jones, II. Oct 79, 212p WES-MP-0-79-4
Contract DACW39-78-M-2676

This report is a tutorial for learning graphics programming with the Graphics Compatibility System (GCS). GCS is a collection of ANSI standard FORTRAN subroutines invokable by a user's FORTRAN program. The report covers GCS's capabilities. GCS can produce a simple line drawing or handle comprehensive general purpose axis creation and automatic clipped; arc and conic generation; graphics input; secondary coordinate systems; multiple software character fonts; data structures; segmentation; and color. The report addresses both two- and three-dimensional graphics capability within GCS. (Author)

AD-A082 777/4 PC **A02**/MF **A01**
Litton Systems Inc Van Nuys CA Data Systems Div
PLANIT Utility Program - PUPTWO User Manual.
Research product rept.
Aug 76, 17p 125201-901, ARI-RP-80-10
Contract DAHC19-76-C-0014

This document is a user's manual for the revised PLANIT Utility Program (PUPTWO), which executes on the AN/GYK-12 (V) computer under the Programming Support System (B) Operating System (PSS/OS). PUPTWO contains specialized utility routines to accomplish specific tasks in support of the installation of PLANIT, and it will run in any PSS/OS system. (Author)

AD-A082 778/2 MF **A01**
Litton Systems Inc Van Nuys CA Data Systems Div
Design Description Document for PLANIT System Enhancements.
Research product rept.
Apr 77, 48p 125200-901, ARI-RP-80-11
Contract DAHC19-76-C-0014
Availability: Microfiche copies only.

This document presents the design changes that allows a PLANIT lesson to control ACC/OCC, VFMED, and MIOD terminals so that TACFIRE/TOS2 systems operations can be simulated under PLANIT. (Author)

AD-A082 879/8 MF **A01**
Litton Systems Inc Van Nuys CA Data Systems Div
user Manual for the Short System Tape Generator (SSTGEN).
Research product.

May 77, 32p 586000-914, ARI-RP-80-12
Contract DAHC19-76-C-0014
Availability: Microfiche copies only.

This document is a user's manual for the Short System Tape Generator (SSTGEN), a utility program that executes on the AN/GYK-12(V) computer under the Programming Support System (B) Operating System (PSS/OS). SSTGEN converts compiler object decks and data decks into a system load tape, compatible with PLANIT and MADCAP system loading and operation. Input may be from cards, commercial tape, or disk; output is to commercial tape, Tape Transport Cartridge (TTC), or punched cards. (Author)

AD-A082 885/5 PC **A10**/MF **A01**
Massachusetts Inst of Tech Cambridge Lab for Computer Science
Automatic Verification of Serializers.
Doctoral thesis,
Russell Roger Atkinson. Mar 80, 207p Rept no. MIT/LCS/TR-229
Contract N00014-75-C-0661, Grant NSF-MCS74-21892

This thesis is concerned with the problem of controlling concurrent access to shared data. A language construct is proposed to enforce such control; a specification language is defined to describe the formal requirements of such control; and verification techniques are given to prove that instances of the construct satisfy their specifications. The techniques are justified in terms of the definition of the construct and the definition of the specification language. Results are given for a program that implements a number of the techniques, illustrated by verifying several versions of the readers-writers problem. Interactions between instances of the construct are discussed in the context of a simple file system. (Author)

AD-A082 927/5 PC **A02**/MF **A01**
Maryland Univ College Park Dept of Computer Science
Research on the Evaluation of Computer System Architectures.
Interim rept.,
Ashok K. Agrawala. Feb 80, 10p AFOSR-TR-80-0266
Grant AFOSR-78-3654

This study of Computer System Architecture Evaluation is divided in four subproblems. Any evaluation of a system architecture has to be done with reference to the processing demands placed on it. The first subproblem we have been studying is that of suitable representation of the user processing needs. Given a suitable characterization of the user processing needs, various techniques may be used for the system architecture evaluation. The second part of this study is aimed at the techniques applicable for architecture evaluation.

AD-A082 985/3 PC **A10**/MF **A01**
IIT Research Inst Chicago IL
A Review of Software Maintenance Technology.
Interim rept. Mar-Nov 79,
John D. Donahoo, and Dorothy R. Swearingen. Feb 80, 220p RADC-TR-80-13
Contract F30602-78-C-0255

The purpose of this effort was to develop a comprehensive statement about software maintenance techniques and tools in use today. This report focuses on software maintenance technology as it is described and defined in open literature and technical reports. Material was selected based on its relevance to the subject of software maintenance and date it was published. Generally, only papers and articles published since 1974 and reports and books published since 1975 were selected. (Author)

ANL/MHD-79-11 PC **A15**/MF **A01**
Argonne National Lab., IL.
User's Guide for GSMP, a General System Modeling Program.
J. M. Cook. Oct 79, 349p
Contract W-31-109-ENG-38

GSMP is designed for use by systems analysis teams. Given compiled subroutines that model the behavior of components plus instructions as to how they are to be interconnected, this program links them together to model a complete system. GSMP offers a fast response to management requests for reconfigurations of old systems and even initial configurations of new systems. Standard system-analytic services are provided: parameter sweeps, graphics, free-form input and formatted output, file storage and recovery, user-tested error diagnostics, component model and integration checkout and debugging facilities, sensitivity analysis, and a multimethod optimizer with nonlinear constraint handling capability. Steady-state or cyclic time-dependence is simulated directly, initial-value problems only indirectly. The code is written in PL/I, but interfaces well with FORTRAN component models. Over the last five years GSMP has been used to model theta-pinch, tokamak, and heavy-ion fusion power plants, open- and closed-cycle magneto-hydrodynamic power plants, and total community energy systems. (ERA citation 05:012869)

CERN-78-12 PC **A04**/MF **A01**
European Organization for Nuclear Research, Geneva (Switzerland).
SIGMA, A New Language for Interactive Array-Oriented Computing.
R. Hagedorn, J. Reinfelds, C. Vandoni, and L. van Hove. 21 Dec 78, 73p
U.S. Sales Only.

A description is given of the principles and the main facilities of SIGMA (System for Interactive Graphical Mathematical Applications), a programming language for scientific computing whose major characteristics are automatic handling of multi-dimensional rectangular arrays as basic data units, interactive operation of the system, and graphical display facilities. After introducing the basic concepts and features of the language, the report describes in some detail the methods and operators for the automatic handling of arrays and for their graphical display, the procedures for construction of programs by users, and other facilities of the system. The report is a new version of CERN 73-5. (Atomindex citation 10:462049)

COO-2383-0060 PC **A04**/MF **A01**
Illinois Univ. at Urbana-Champaign. Dept. of Computer Science.
GALMOL: An Automatic Solver for Partial Differential Equations.
C. C. Hsiung. Sep 79, 65p UIUCDCS-R-79-977, UILU-ENG-79-1725
Contract EY-76-S-02-2383

The GALerkin Method Of Lines code package, GALMOL, is designed to solve parabolic partial differential equations having a single space dimension. It uses either the finite element method or the Gaussian collocation method for space discretizations. A robust ordinary differential equation solver is used as the time integrator; it is very efficient and achieves high accuracy. After introductory material, some theoretical background about the semi-discrete Galerkin method is given. Next, the features and implementation of GALMOL are described, including the structures and different options of the program. Although the input language is largely self-explanatory, a description and a user's guide are provided. The performance and ease of use of the package are illustrated for the heat equation, Burger's equation, and the wave equation. Some typical input and prototype CYBER JCL sequences are given. (ERA citation 05:014582)

FIPS PUB 60-1 PC **A05**/MF **A01**
National Bureau of Standards, Washington, DC.
I/O Channel Interface. Category: Hardware Standard. Subcategory: Interface.
Federal information processing standards (Final). c1971, 85p
Supersedes FIPS PUB 60.
Three ring FIPS binder also available, North American Continent price $6.25; all others write for quote.

This standard defines the functional, electrical, and mechanical interface specifications for connecting computer peripheral equipment as a part of automatic data processing (ADP) systems. This standard, together with a companion standard for power control, defines the hardware characteristics for the I/O channel level interface. In order to achieve full plug-to-plug interchangeability of peripheral components, device class specific operational specifications standards are also required for each class of peripheral device. These operational specifications standards will be proposed as Federal Information Processing Standards to accompany this standard as they are developed. The Government's intent in employing this I/O Channel Interface standard is to reduce the cost of satisfying the Government's data processing requirements through increasing its available alternative sources of supply for computer system componentsat the time of initial system acquisition, as well as in system replacement and augmentation and in system component replacement. This standard is also expected to lead to improved reutilization of system components. When acquiring ADP systems and system components, Federal agencies shall cite this standard in specifying the interface for connecting computer peripheral equipment as a part of ADP systems. (Copyright (c) 1971 by International Business Machines Corporation.)

FOA-C-20281 PC **A04**/MF **A01**
Foersvarets Forskningsanstalt, Stockholm (Sweden).
Performance Evaluation of a Prototype Relational Data Base Handler for Technical and Scientific Data Processing.
P. Svensson. Dec 78, 51p
U.S. Sales Only.

Since 1975 research in data base technology has been carried out at the Swedish National Defense Research Institute's section 043 (computer science and applied mathematics with control theory), with the objective of evaluating the possibilities to construct a general support system for technical and scientific data processing, based on modern theories and methods for data storage and retrieval. A phase of our work which has recently been completed consisted of the design, programming, and performance evaluation of a prototype high-performance data handler for a relational data base system. This report presents the results of the performance evaluation, which has been carried out as a comparison with a commercially available data base system. (Atomindex citation 10:463824)

JEN-433 PC **A03**/MF **A01**
Junta de Energia Nuclear, Madrid (Spain).
PERSEO. A Flexible Subroutine System for Plotting of Three-Dimensional Graphs.
J. Guasp. 1979, 41p
In Spanish.
U.S. Sales Only.

The Perseo subroutine system allows the drawing of three-dimensional graphics at the digital plotter Calcomp-936, as well in ordinary perspective, with two variable angles, as in cavalier perspective, with only one angle. It has high versatility and can be used in a very simple way. The drawing of lines uses histograms and allows the correct handling of hidden lines. It has been writen in Fortran V for the Univac-1110 from J.E.N. (Atomindex citation 10:462048)

JINR-10-11500 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Computing Techniques and Automation.
Electronic Unit for the CAMAC Semiautomatic Measuring Instrument for Chamber Image Processing.
N. A. Datsko, T. A. Demina, and Ch. Dehchinpuntsag. 1978, 11p
In Russian.
U.S. Sales Only.

An electronic part of the CAMAC semiautomatic measuring device for processing chamber pictures is described. The device is more reliable, quick, advantageous, as compared to a previously manufactured. It contains: two BRK-18 incremental point counters, a unit to handle constants and receipt a data from a computer by an operator a crate controller for the BESM-4 computer via a branch driver. The units located in a single CAMAC crate are made on TTL IC. (Atomindex citation 10:470987)

KFK-2642 PC **A15**/MF **A01**
Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Inst. fuer Datenverarbeitung in der Technik.
Ninth Annual Meeting of the Siemens Process Computer Users Group.
U. Voges. Apr 78, 328p CONF-7804138-
In German.Annual meeting of the Siemens Prozessrechner Anwendekreis 1, Karlsruhe, F.R. Germany, 5 Apr 1978.
U.S. Sales Only.

Separate abstracts have been prepared for items within the scope of the energy data base. (Atomindex citation 10:441768)

LBL-10189/3 PC **A03**/MF **A01**
California Univ., Berkeley. Lawrence Berkeley Lab.
FTN4 Optimization Techniques.
R. Friedman. Nov 79, 26p
Contract W-7405-ENG-48

Both the optimizations that the compiler performs for the user and those the user can embody in the source code are described. Most of these optimizations decrease central processor time (not always at the expense of field length), but some decrease field length, input/output time, real time, or throughput. The best way to optimize code is to use efficient algorithms. The higher the level at which a program is optimized, the better the results. 1 table. (ERA citation 05:014599)

LBL-9433 PC **A18**/MF **A01**
California Univ., Berkeley. Lawrence Berkeley Lab.
Proceedings of the Fourth Berkeley Conference on Distributed Data Management and Computer Networks.
Aug 79, 425p CONF-790834-
Contract W-7405-ENG-48
Berkeley workshop on distributed data management and computer networks, Berkeley, CA, USA, 28 Aug 1979.

Individual abstracts were prepared for 19 of the papers in these proceedings. The remaining two have already been cited in ERA, and may be located by reference to the entry CONF-790834-- in the Report Number Index. (ERA citation 05:014583)

LTSS-307(Ed.3) PC **A06**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Livermore Timesharing System. Part 4: Library Files. Chapter 307: Mathematics and Statistics Software Library Catalog.
R. C. Basinger, A. Greenbaum, and M. Jepson.
12 Nov 79, 110p
Contract W-7405-ENG-48

A library of mathematical and statistical routines maintained by the Laboratory's Mathematics and Statistics Section is described, and instructions for users of the LLL Computer Facility to obtain the source programs in this library are given. Brief descriptions of the routines are included. (ERA citation 05:014601)

N80-21037/0 PC **A04**/MF **A01**
Timoc International Co., Flintridge, CA.
Mil-M-38510/470 Test Vectors: Fault Detection Efficiency Measurement Via Hardware Fault Simulation.
Final Report, Nov. 1979 - Mar. 1980.
C. C. Timoc. 10 Mar 80, 67p NASA-CR-162916, JPL-9950-308
Contracts NAS7-100, JPL-955502
Prepared for JPL.

The stuck fault detection efficiency of the test vectors developed for the MIL-M-38510/470 NASA was measured using a hardware stuck fault simulator for the 1802 microprocessor. Thirty-nine stuck faults were not detected out of a total of 874 injected into the combinatorial and sequential parts of the microprocessor. Since undetected faults can create catastrophic errors in equipment designed for high reliability applications, it is recommended that the MIL-M-38510/470 NASA be enhanced with additional test vectors so as to achieve 100% stuck fault detection efficiency.

N80-21043/8 PC **A06**/MF **A01**
National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
ISIS Users Manual.
C. Grantham. Mar 80, 118p NASA-TM-80144

A user manual for the interactive software invocation system (ISIS) is presented. The operational concepts and syntax of the interactive programming language are documented.

N80-21045/3 PC **A02**/MF **A01**
National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
Workshop on Real-Time Programming for NASA Flight Project.
J. C. Knight. Feb 80, 11p NASA-TM-80236
Workshop Held at Hampton, VA., 17-19 Oct. 1979; Sponsored by NASA, Langley Research Center, Hampton, VA. And the Inst. For Computer Applications in Science and Engineering.

The role of high-level languages in the preparation of real time flight software is discussed.

ORNL/CSD/TM-97 PC **A03**/MF **A01**
Oak Ridge National Lab., TN.
NASTI User's Manual.
P. W. Gaffney. Dec 79, 27p
Contract W-7405-ENG-26

The use of the NASTI data base is explained. Specifically, NASTI is a Numerical Analysis Software Tutorial Inquirer. It is an interactive program designed to inform computer users of some of the state-of-the-art mathematical routines that exist at Oak Ridge. The information that is provided by NASTI is intended to help users, with mathematical problems, to make the correct choice of a numerical routine. Moreover, in addition to providing help to these users, NASTI is designed to reduce the possibility of acquiring software that already exists at Oak Ridge. 4 figures, 1 table. (ERA citation 05:009555)

ORNL/TM-7126 PC **A03**/MF **A01**
Oak Ridge National Lab., TN.
Rigorous, Systematic Approach to Automatic Data Editing and Its Statistical Basis.
G. E. Liepins. Feb 80, 36p
Contract W-7405-ENG-26

Automatic data editing is the computerized identification and correction (optional) of data errors. These techniques can provide error statistics that indicate the frequency of various types of data errors, diagnostic information that aids in identifying inadequacies in the data collection system, and a clean data base appropriate for use in further decision making, in modeling, and for inferential purposes. However, before these numerous benefits can be fully realized, certain research problems need to be resolved, and the linkage between statistical error analysis and extreme-value programming needs to be carefully determined. The linkage is provide here for the special case that certain independence and symmetry conditions obtain; also provided are rigorous proofs of results central to the functioning of the Boolean approach to automatic data editing of coded (categorical) data. In particular, sufficient collections of edits are defined, and it is shown that for a fixed objective function the solution to the fields to impute problem is obtainable simply from knowing which edits of the sufficient collection are failed. and this solution is invariant of the particular sufficient collection of edits identified. Similarly, disjoint-sufficient collections of edits are defined, and it is shown that, if the objective function of the fields to impute problem is determined by what Freund and Hartley call the number of involvements in unsatisfied consistency checks, then the objective function will be independent of the disjoint-sufficient collection of edits used. (ERA citation 05:014617)

PAT-APPL-6-100 685 PC **A02**/MF **A01**
Department of the Army Washington DC
Microprocessor Controlled Digital Detector.
Patent Application,
Donald K. Fronek, and Richard A. Lane. Filed 5 Dec 79, 19p AD-D007 103/5
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

Amplitude information for the original input signal may be preserved or a simple threshold of energy may be detected within a bandpass. The microprocessor scans a selected frequency spectrum by digitally changing the decoding data controlled by software. This detector in conjunction with a scanning algorithm permits data acquisition in addition to energy detection, data acquisition being the process of controlling an incoming signal within a bandpass by moving the center frequency and bandpass of the filter and generating a corresponding error signal as the feedback control signal. Digital filtering and detection techniques have enhanced signal processing with the aid of faster hardware and efficient software to provide a logic signal indicative of a desired energy within the pass band and to preserve the signal amplitude. A microprocessor controlled digital detector has a center frequency and bandpass which can be changed as a function of time. Amplitude signal information can be preserved. Input signals are shaped for digital processing. A peripheral interface adapter formats these inputs for the microprocessor which is under both ROM and RAM program control for determining the center frequency. The microprocessor output is through a peripheral interface adapter.

PAT-APPL-6-101 927 PC **A02**/MF **A01**
Department of the Army Washington DC
Circuit for Test of Ultra High Speed Digital Arithmetic Units.
Patent Application,
Donald W. Burlage, and James F. Lancastar.
Filed 10 Dec 79, 7p AD-D007 101/9
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A method is shown for testing ultra high speed digital arithmetic circuits or even complete digital signal processors which operate at speeds faster than presently available test equipment. With this technique for testing, the operating speed of digital circuits can be increased until failures occur and then quantitative information on failure rates can be measured. (Author)

PAT-APPL-6-134 718 PC **A02**/MF **A01**
Department of the Air Force Washington DC
Method and Apparatus for Augmenting Binary Patterns.
Patent Application,
John G. Romanski. Filed 27 Mar 80, 24p AD-D007 121/7
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

The conversion of simple '1' and '0' PIXELS of a binary pattern into PIXELS with numerical values dependent upon relative location in the original pattern is realized by a technique that identifies various types of PIXELS including the edge PIXELS in contiguous groups of '1' PIXELS. A multilevel pattern using the various types of PIXELS is developed and a numerical value assigned to each PIXEL. The numerical value for each PIXEL is a function of its own type and the types of its near neighbor PIXELS. Pattern measurements for the augmented pattern are less sensitive to erroneous cell deletions than for simple binary patterns. The technique is implemented by a simple mechanization for generating the augmented pattern. The mechanization is characterized by operations that are easily implemented in a real time environment using standard digital logic devices. (Author)

PB80-168172 PC **E04**/MF **A01**
Federal Compiler Testing Center, Washington, DC.
Burroughs Corporation, COBOL 74 - Release 9.0.
Validation summary rept.
21 Apr 80, 102p CCVS74-VSR510

This Validation Summary Report (VSR) for the Burroughs Corporation small system COBOL Compiler Version 9 (MCPII Version IX) provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1974 Cobol Standard (X3.23-1974/FIPS PUB 21-1). The compiler was validated at the high level of FIPS PUB 21-1. The VSR is made up of several sections showing the discrepancies found. These include an overview of the validation which lists all categories of discrepancies by level/module within X3.23-1974, a section relating the categories of discrepancies to each of the Federal levels of the

language; and a detailed listing of discrepancies together with the tests which were failed.

PB80-168180 PC **E04**/MF **A01**
Federal Compiler Testing Center, Washington, DC.
Burroughs Corporation, COBOL 74 - Release 6.3.
Validation summary rept.
21 Apr 80, 119p CCVS74-VSR505

This Validation Summary Report (VSR) for the Burroughs Corp. medium systems COBOL Compiler Version 6.3 (MCPIV Version 6.3) provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1974 Cobol Standard (X3.23-1974/FIPS PUB 21-1). The compiler was validated at the high level of FIPS PUB 21-1. The VSR is made up of several sections showing the discrepancies found. These include an overview of the validation which lists all categories of discrepancies by level/module within X3.23-1974, a section relating the categories of discrepancies to each of the Federal levels of the language; and a detailed listing of discrepancies together with the tests which were failed.

PB80-168198 PC **E02**/MF **A01**
Federal Compiler Testing Center, Washington, DC.
Burroughs Corporation, FORTIV (FORTRAN 66) Release 6.3.
Validation summary rept.
21 Apr 80, 20p FCVS66-VSR515

This Validation Summary Report (VSR) for the Burroughs Medium System Fortran Compiler Version FORTIV 6.3 (MCPIV Version 6.3) provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1966 Fortran Standard (X3.9-1966). The VSR is made up of several sections showing the discrepancies found. These include an overview of the validation which lists all categories of discrepancies; a section relating the categories of discrepancies to the language; and a detailed listing of discrepancies together with the tests which were failed.

PB80-168248 PC **E02**/MF **A01**
Federal Compiler Testing Center, Washington, DC.
Harris Corporation, Harris S-500 and S-800 FORTRAN Version 07C.
Validation summary rept.
29 Feb 80, 19p FCVS78-VSR545

This Validation Summary Report (VSR) for the Harris Fortran Compiler Version 07C (VULCAN Version 07C) provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1966 Fortran Standard (X3.9-1966). The VSR is made up of several sections showing the discrepancies found. These include an overview of the validation which lists all categories of discrepancies; a section relating the categories of discrepancies to the language; and a detailed listing of discrepancies together with the tests which were failed.

PB80-168255 PC **E03**/MF **A01**
Federal Compiler Testing Center, Washington, DC.
Wang Laboratories, Inc., Wang vs Cobol Compiler.
Validation summary rept.
8 Feb 80, 42p CCVS74-VSR520

This Validation Summary Report (VSR) for the Wang VS COBOL Compiler Version 2.8.5 (05 Version 4.1.1) provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1974 COBOL Standard (X3.23-1974/FIPS PUB 21-1). The compiler was validated at the Low level of FIPS PUB 21-1. The VSR is made up of several sections showing the discrepancies found. These include an overview of the validation which lists all categories of discrepancies by level/module within X3.23-1974, a section relating the categories of discrepancies to each of the Federal levels of the language; and a detailed listing of discrepancies together with the tests which were failed.

PB80-168263 PC **E04**/MF **A01**
Federal Compiler Testing Center, Washington, DC.
Burroughs Corporation, Large Systems COBOL74, Version 3.2.
Validation summary rept.
5 Mar 80, 88p CCVS74-VSR540

This Validation Summary Report (VSR) for the Burroughs Large Systems COBOL Compiler Version 3.2 (MCP Version III.1) provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1974 COBOL Standard (X3.23-1974/FIPS PUB 21-1). The compiler was validated at the High level of FIPS PUB 21-1. The VSR is made up of several sections showing the discrepancies found. These include an overview of the validation which lists all categories of discrepancies by level/module within X3.23-1974, a section relating the categories of discrepancies to each of the Federal levels of the language; and a detailed listing of discrepancies together with the tests which were failed.

PB80-168271 PC **E03**/MF **A01**
Federal Compiler Testing Center, Washington, DC.
Prime Computer Corporation Cobol Revision 01.
Validation summary rept.
8 Feb 80, 45p CCVS74-VSR535

This Validation Summary Report (VSR) for the Prime Computer, Inc. COBOL Compiler Version 01 (PRIMOS Version 16) provides a consolidated summary of results obtained from the validation of the subject compiler against the 1974 COBOL Standard (X3.23-1974/FIPS PUB 21-1). The compiler was validated at the Low level of FIPS PUB 21-1. The VSR is made up of several sections showing the discrepancies found. These include an overview of the validation which lists all categories of discrepancies by level/module within X3.23-1974, a section relating the categories of discrepancies to each of the Federal levels of the language; and a detailed listing of discrepancies together with the tests which were failed.

PB80-168347 PC **E03**/MF **E03**
International Inst. for Applied Systems Analysis, Laxenburg (Austria).
DIF: Automatic Differentiation of FORTRAN-Coded Polynomials.
Final rept.,
William Orchard-Hays, and I. Butrimenko. c1978, 41p RM-78-45

The program described creates the first derivative functions of given function of limited complexity, namely generalized polynomials, but involving possibly many variables. Neither nested functions nor general rational forms are handled. However, partials to such functions can usually be readily programmed using those forms produced automatically. Similarly, if a function of many variables is nonlinear in only a few, only derivatives of nonlinear terms need to be created; the constant derivatives can be added with ordinary DO-loops or similar standard programming techniques. After an explanatory foreword, usage of the program is explained. This can be regarded as a users manual. Thereafter, detailed explanations of the method, including flowcharts, are given.

PB80-174493 PC **E03**/MF **A01**
Federal Compiler Testing Center, Washington, DC.
Data General Corporation AOS COBOL Revision 3.00.
Validation summary rept.
22 Apr 80, 71p CCVS74-VSR560

This Validation Summary Report (VSR) for the Data General AOS COBOL Compiler Version 3.00 (AOS Version 3.11) provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1974 COBOL Standard (X3.23-1974/FIPS PUB 21-1). The compiler was validated at the low-intermediate level of FIPS PUB 21-1. The VSR is made up of several sections showing the discrepancies found. These include an overview of the validation which lists all categories of discrepancies by level/module within X3.23-1974, a section relating the categories of discrepancies to each of the Federal levels of the language; and a detailed listing of discrepancies together with the tests which were failed.

PB80-177678 PC **A10**/MF **A01**
National Bureau of Standards, Washington, DC. Inst. for Computer Sciences and Technology.
Computer Science and Technology: Audit and Evaluation of Computer Security II: System Vulnerabilities and Controls. Proceedings of the NBS Invitational Workshop Held at Miami Beach, Florida on November 28-30, 1978.
Final rept.,
Zella G. Ruthberg. Apr 80, 216p NBS-SP-500-57
Sponsored in part by General Accounting Office, Washington, DC. Library of Congress catalog card no. 80-600034.

The National Bureau of Standards, with the support of the U.S. General Accounting Office, sponsored a second invitational workshop on computer security audit, on November 28-30, 1978. A cross-section of highly qualified people in the computer science and EDP audit fields was assembled to develop material that would be directly usable for a Federal Information Processing Standard (FIPS) Guideline on the subject. In order to cover the material in a systematic fashion, the workshop was partitioned into three management sessions and five technical sessions. The management sessions addressed Managerial and Organizational Vulnerabilities and Controls at the staff level (1 session) and the line level (2 sessions). The technical sessions addressed vulnerabilities and controls in the areas of Terminal and Remote Peripherals, Communication Components, Operating Systems, Applications and Non-Integrated Data Files, and Data Base/Data Base Management Systems. These Proceedings are the reports developed by the eight sessions of the workshop.

PB80-810179 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Aerospace Computer Systems: Avionics Applications. 1978-March, 1980 (Citations from the NTIS Data Base).
Rept. for 1978-Mar 80,
Brian Carrigan. May 80, 154p
Supersedes NTIS/PS-79/0313 and NTIS/PS-78/0289. See also 1964-1975, NTIS/PS-77/0125 and 1976-1977, NTIS/PS-79/0312.

Studies of computer hardware and supporting software for aircraft applications are cited. The bibliography includes research on onboard data processing equipment as well as navigation and guidance computers. (This updated bibliography contains 147 abstracts, 56 of which are new entries to the previous edition.)

PB80-810187 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Aerospace Computer Systems: Space and Guided Missile Applications. 1978-March, 1980 (Citations from the NTIS Data Base).
Rept. for 1978-Mar 80,
Brian Carrigan. May 80, 159p
Supersedes NTIS/PS-79/0315 and NTIS/PS-78/0290. See also 1964-1975, NTIS/PS-77/0223 and 1976-1977, NTIS/PS-79/0314.

Studies of computer hardware and supporting software for spacecraft and guided missile applications are cited. The bibliography includes research on onboard data processing equipment, telemetering data processing, and navigation and guidance computers. (This updated bibliography contains 152 abstracts, 44 of which are new entries to the previous edition.)

SAND-78-1680 PC **A05**/MF **A01**
Sandia Labs., Albuquerque, NM.
Scientific Computing at Sandia Laboratories: A Long-Range Plan.
P. Lemke. Nov 79, 85p
Contract EY-76-C-04-0789

Major inadequacies and problems have developed in the present scientific computer complex at Sandia Laboratories, Albuquerque (SLA). This plan proposes to correct these inadequacies with a general concept whose implementation is specific. The concept presented here for meeting the computational needs of SLA is expected to guide the architectural design of the CCF for an extended period of time. The implementation of this concept is subject to change as installation progresses. This plan reflects the current state of technology, and, as new technology is developed, the plan will be modified to use innovations. This document ful-

fills two requirements: to provide management and users of scientific computing with a preliminary description of the facilities and elements of the proposed new scientific computing complex, and to provide the designers and implementers of the complex a basic system design that can be expanded as each area of the plan evolves. 17 figures, 1 table. (ERA citation 05:012882)

SAND-79-0579 PC **A02**/MF **A01**
Sandia Labs., Albuquerque, NM.
CDC6600/7600 Subroutine for Bessel Functions K/sub nu /(X), X > 0, nu Greater Than or Equal to 0.
D. E. Amos. Dec 79, 14p
Contract EY-76-C-04-0789

Formulae for K/sub nu /(x) and K/sub nu +1/(x) are implemented on intervals $0 < x$ less than or equal to 2, $2 < x < 17$, x greater than or equal to 17 and -1/2 less than or equal to nu < 1/2 to start forward recursion for N member sequences K/sub nu +k-1/(x), k = 1, . . ., N. On $0 < x$ less than or equal to 2 a recursive form of the power series is used, while the backward recursive Miller algorithm is implemented for the confluent hypergeometric representation on $2 < x < 17$. For x greater than or equal to 17, K/sub nu (x) and K/sub nu +1(x) are computed from the asymptotic expansion for x implies infinity. If the initial order nu is larger than 35, the sequence is started by computing two members with the uniform asymptotic expansion for nu implies infinity. Overflow and underflow tests are made on the leading term of the uniform expansion when appropriate. An option for exponential scaling is also provided. (ERA citation 05:012883)

SAND-79-1825 PC **A02**/MF **A01**
Sandia Labs., Albuquerque, NM.
Quadrature Subroutines for Splines and B-Splines.
D. E. Amos. Dec 79, 12p
Contract EY-76-C-04-0789

The B-spline package of De Boor numerically manipulates B-splines in a variety of ways. Notably absent from the package are routines for integrating B-splines. To cover this deficiency BSQUAD, PPQUAD, BFQUAD, and PFQUAD for integrating splines and B-splines were constructed and are described herein. BSQUAD accepts the B-representation in terms of the knot array T(*), the coefficient array BCOEF(*), the number of coefficients N, and the order K to compute integrals on subintervals of T(K) less than or equal to X less than or equal to T(N + 1). Distinct knots partition the interval of integration so that polynomial integration by a Gauss quadrature formula can be implemented. The piecewise polynomial (PP) representation, although not preferred over the B-representation for solving problems, is sometimes needed, and the De Boor package has a routine to make the conversion. This PP form is accepted by PPQUAD, which sums polynomial evaluations of integrals on the partition. More general integrals for the product of a function f(x) and a B-spline are computed similarly in subroutines BFQUAD and PFQUAD using a quadrature routine with error control and a code structure similar to that in BSQUAD and PPQUAD. (ERA citation 05:012884)

UCID-18507 PC **A06**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Displaying the Results of Three-Dimensional Analysis Using GRAPE. Part One: Vector Graphics.
B. E. Brown. Oct 79, 117p
Contract W-7405-ENG-48

GRAPE is a display program for three-dimensional polygon and polyhedral models. It can produce line-drawing and continuous-tone black and white or color images in still frame or movie mode. The code was written specifically to be a post-processor for finite element and finite difference analyses. It runs on the CDC 7600 computer, and is compiled with the LLL FTN system. The allocation of storage is dynamic. There are presently three data paths into the code. The first is the binary interface from the analyses codes and this with the other databases is described. The second data path is the SAMPP format, and the last is the MOVIE format. The code structure is described first; then the commands are discussed in general terms to try to give the user some feel for what they do. The next section deals with the exact format of the commands by overlay. Then examples are given and discussed. Next, the various output options are covered. 57 figures. (ERA citation 05:014604)

UCID-18526 PC **A03**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Multiprocessor Connection Schemes.
B. S. Lawver. Jan 80, 37p
Contract W-7405-ENG-48

Multiprocessor connection schemes are surveyed, and research in the area of parameterizing these schemes is proposed. A multiprocessor is a set of processing elements that are able to cooperate in the execution of a computation, with the goals of improved performance and lower cost. Several multiprocessor organizations are examined, the connections of these multiprocessor organizations are explored, and a model that emphasizes multiprocessor connections is introduced. 23 figures, 1 table. (ERA citation 05:014605)

UCID-30175(Rev.1) PC **A04**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Array Processing for FORTRAN.
C. Wetherell. 31 Jan 80, 69p
Contract W-7405-ENG-48

The Special Task Force on Cray FORTRAN (STF) was chartered to consider ...new language features to exploit the vector hardware of the CRAY-1 that might also be applicable to other large scientific computers. The new array processing features in STF FORTRAN provide access to the computing power of vector machines in a way which is easy for the programmer to write, easy for others to read, and easy for compilers to process. Array processing for FORTRAN means that most of the operations in FORTRAN that may be done for ordinary scalar variables may also be done for arrays. In addition, features for selecting sections of arrays, for packing and unpacking arrays, for using arrays as procedure arguments, and for using arrays with generic functions are provided by STF FORTRAN. Simple array objects are introduced first, and the basic definitions necessary for the discussion are made. Next, methods for the construction of array expressions are described and the array assignment statement is defined. A new coercion, broadcasting of scalars, is explained. The ideas of array shape and extent are reexamined and enlarged, and the class of array objects is widened to include several kinds of array sections (slices). Conditional array assignment and array packing and unpacking are discussed next; the operations are tied together in their usage. The use of arrays with procedures is described, both old and new generic functions are defined as applied to arrays. This is a reference manual. It does contain some examples and illustrations of usage, but they should not be taken as suggesting either appropriate or efficient usage of any features. This is not a user's manual. 16 figures 3 tables. (ERA citation 05:014606)

UCRL-83702 PC **A02**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
S-1 Project: Developing High-Performance Digital Computers.
L. C. Widdoes, Jr. 11 Dec 79, 12p CONF-800201-5
Contract W-7405-ENG-48
COMPCON 1980, San Francisco, CA, USA, 25 Feb 1980.

A multiprocessor (the S-1) with at least ten times the computational power of the Cray-1 is being designed and implemented. The first step is to develop a general-purpose uniprocessor with a performance level comparable to the Cray-1; the multiprocessor will then be made up of 16 of these uniprocessors, sharing a main memory. The uniprocessors can be used together for large problems or separately for several smaller problems. To reduce average memory-access time, each uniprocessor has a private cache memory. A powerful design system (SCALD) that supports extremely efficient structured design of digital logic was also developed. Using advanced compiler and verification techniques, SCALD can complete the details of a computer design starting from a high-level specification. 5 figures, 1 table. (ERA citation 05:014608)

9C. Electrical and Electronic Engineering

AD-A082 752/7 PC **A08**/MF **A01**
Rensselaer Polytechnic Inst Troy NT Dept of Electrical and Systems Engineering
Acousto-Optic Interaction in Surface Acoustic Waves and Its Application to Real Time Signal Processing.
Technical rept.,
D. Schumer, and P. Das. 30 Dec 77, 164p Rept no. MA-ONR-30
Contract N00014-75-C-0772

The theory of the interaction of coherent light with surface acoustic waves and an experimental demonstration of the application of the interaction to new devices are presented. The analysis, based upon classical electromagnetic theory and a phenomenological formulation of the photoelastic effect, is applied to the piezoelectric material LiNbO3, and provides good agreement with previously published experimental data. Explicit account is taken of the linear electro-optic and linear elasto-optic contributions to the interaction. The experimental demonstration of applications is restricted to the side-entry technique, an interaction configuration providing the longest interaction length between a surface acoustic wave and unguided optical wave. The relative merits of this configuration are discussed. New experimental results for the real-time side-entry convolver employing optical heterodyning include autocorrelation of Barker codes, ambiguity function generation, demonstration of a parallel acoustic track geometry to inhibit reflections, and measurement of diffraction characteristics for polarized light. Results are given for the correlation of a time varying light intensity distribution with an electrical signal, and the application to an optical communication system is indicated. The scanning of one and two dimensional black and white transparencies is performed, and the extension to color image scanning is demonstrated. All experiments are performed using Y-cut Z-propagating LiNbO3. Acoustic frequencies employed range from 45 MHz to 100 MHz. Laser sources are HeNe and Ar. Devices are analyzed and discussed with reference to the diffraction integral of scalar diffraction theory.

CONF-790904-P2 PC **A17**/MF **A01**
Department of Energy, Washington, DC.
Systems Engineering for Power: Organizational Forms for Large Scale Systems. Volume I.
L. H. Fink, and T. A. Trygar. Oct 79, 376p
Systems engineering for power: emergency operating state control conference, Davos, Switzerland, 30 Sep 1979.

Separate abstracts have been prepared for each individual section. (ERA citation 05:013530)

DOE/ET/1214-T1 PC **A11**/MF **A01**
Systems Control, Inc., Palo Alto, CA.
Impacts of Dispersing Storage and Generation in Electric Distribution Systems. Final Report.
F. S. Ma, L. Isaksen, and R. Patton. Jul 79, 250p
Contract EY-76-C-03-1214

Small-scale Dispersed Storage and Generation (DSG) connected to the electric-distribution systems provide one alternative to large-scale additions to utility supply and delivery systems. In addition to being generating sources, DSG may also provide benefits to the distribution system by reducing capacity requirements, improving reliability, and lowering losses. This study offers a consistent, unifying methodology for evaluating the dispersion effect of DSG in distribution systems. The evaluation method and models developed compare the distribution systems expanded with and without DSG, using a consistent set of planning and operating criteria. The effects of DSG outages probabilities, diseconomies of scale, and loss savings are explicitly treated. The method also takes into account the effect on the bulk-supply system when DSG is planned and operated for distribution-system needs. To obtain the overall DSG impact

on a utility system, the results derived from this methodology can readily be combined with the impact of the technologies assessed from a bulk-supply perspective undertaken in other studies. This assessment methodology would be suitable for use by most utilities since it is based on extant utility planning procedures and data bases, and practical assessment calculating. Application of this methodology for two utilities showed that the distribution capacity and reliability benefits are highly site-dependent, and that potentially higher production cost and DSG capital cost may be incurred. The study points to the importance of caution and comprehensive assessment before implementing DSG in the distribution system on a large scale. (ERA citation 05:011839)

INKA-Conf-79-095-009 PC **A02**/MF **A01**
Rheinisch-Westfaelisches Elektrizitaetswerk A.G., Essen (Germany, F.R.).
Process of Measurement for Investigating Domestic (Electrical) Loads.
M. Lange-Huesken. 1979, 19p CONF-7905117-7
In German.Conference on power demand and supply - analysis and strategies, Schliersee, F.R. Germany, 16 May 1979.
U.S. Sales Only.

It is shown that tape recorder with load inputs equipment can be used with electronic data processing equipment to obtain a closer idea of the typical overall domestic loads. Accordingly, it is unnecessary to carry out separate measurements of the load and work of each individual piece of equipment which consumes appreciable amounts of power. This would require a much more expensive and less compact measuring device. This measurement is sufficient for maximum work and maximum demand calculations and for the simultaneous detection of the operating periods of the equipment with the highest power consumption via load inputs, in order to be able to carry out an accurate analysis according to power applications using the electronic data processing equipment. One can claim high accuracy, as control measurements show that deviations from effective measured value in this process are not more than 10 in the worst case, but are usually less than 5. (ERA citation 05:010250)

LA-8069-PR PC **A05**/MF **A01**
Los Alamos Scientific Lab., NM.
E-Division Semiannual Report, January 1-June 30, 1979.
P. A. Kelley. Nov 79, 90p
Contract W-7405-ENG-36

The status of the programs and projects of the Electronics Division for the period January through June 1979 is reported. The presentation is divided into three sections: Research, Engineering Support, and Technical Services. Each of these sections presents the activities and accomplishments of the corresponding branch within the Division. The primary goal of the Research and Development branch is to advance technology for future applications. The primary goal of the Engineering Support branch is to apply advanced technology to Laboratory and material problems. The primary goal of the Technical Services branch is to provide a technical base and support for Laboratory programs. These goals are reflected in the report. (ERA citation 05:010464)

N80-20317/7 PC **A03**/MF **A01**
Bionetics Corp., Hampton, VA.
The Vulnerability of Commercial Aircraft Avionics to Carbon Fibers.
J. A. Meyers, and S. Salmirs. Apr 80, 50p NASA-CR-159213
Contract NAS1-15238

Avionics components commonly used in commercial aircraft were tested for vulnerability to failure when operated in an environment with a high density of graphite fibers. The components were subjected to a series of exposures to graphite fibers of different lengths. Lengths used for the tests were (in order) 1 mm, 3 mm, and 10 mm. The test procedure included subjecting the equipment to characteristic noise and shock environments. Most of the equipment was invulnerable or did not fail until extremely high average exposures were reached. The single exception was an air traffic control transponder produced in the early 1960's. It had the largest case open area through which fibers could enter and it had no coated boards.

PAT-APPL-6-122 388 PC **A02**/MF **A01**
Department of the Navy Washington DC
Cooling Apparatus for Electronic Modules.
Patent Application,
Alan J. Bosier, and Larry E. Nash. Filed 19 Feb 80, 14p AD-D007 081/3
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

The present invention provides an improved cooling arrangement for a standard electronic plug-in module assembly having a plurality of standard modules supported in grooves in parallel side plates. Each module has a metallic heat plate which facilitates the transfer of heat from the electronic components to the parallel metallic sides which support the modules. A spring is provided in each groove in the side plates for upwardly biasing each module. A top cold plate is forced downwardly by a screw-operated wedge plate and this cold plate engages a metal frame on each electronic module. The springs in the grooves are compressed and apply a force which insures good contact between the cold plate and each frame of each module thereby facilitating transfer of heat away from each electronic module. The top plate is provided with passages for carrying a cooling liquid for removing heat transferred from the modules to the top plate. It is therefore a general object of the present invention to provide an improved cooling arrangement for an electronic plug-in module assembly.

PB80-165186 PC **A07**/MF **A01**
Purdue Univ., Lafayette, IN. School of Electrical Engineering.
Power System Dynamic Equivalents Using Identification Techniques.
Final technical rept.,
Medhat A. H. Ibrahim. Jun 76, 133p TR-EE76-19, NSF/RA-761848
Grants NSF-GI-38315, NSF-AER75-19711

This report describes the development and demonstration of an equivalent mathematical model for the representation of the external system dynamics at the boundary buses of an internal system. These equivalents are needed for different system studies in which the internal system is represented in detail, and the external system is represented by the equivalents which stimulate interaction of the external system on the internal system for disturbances originating in the internal system. The method employs a generalized Thevenin's theory for representing the quasi-steady-state performance of the external system and the stochastic linear difference equations to represent dynamic changes in equivalent external sources. The model consists of two parts: a static equivalent of the external system, and a dynamic equivalent representation of the external system. Simulated data utilizing a transient stability, short circuit load flow, and energy balance studies. The method was tested on a frequency controlled three-area system and an eleven-bus system. The model functioned well in both cases.

PB80-165616 PC **A02**/MF **A01**
Electricity Council Research Centre, Capenhurst (England).
The Statistical Distribution of Values of Breakdown Voltage for An Air Gap,
W. P. Baker. Sep 79, 20p ECRC/M-1283

An analysis of 30,000 measurements of breakdown voltage on a spark gap removed from a surge diverter shows there to be a linear relation between normal probability and the logarithm of the excess of the applied voltage over a critical voltage. This linearity extended over more than six standard deviations. A statisticcal model is derived which agrees well with the experimental findings and which is investigated further to show that the physical parameter of the breakdown process in air which controls the scatter of test results is the rate of change of the first Townsend coefficient with field.

PNL-2981 PC **A07**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Ozone Field Studies Adjacent to a Hvdc Transmission Test Line.
J. G. Droppo, O. B. Abbey, and D. W. Glover.
Mar 79, 135p
Contract EY-76-C-06-1830

Field studies of atmospheric ozone concentrations adjacent to high voltage direct current (hvdc) transmission test lines were conducted at the Bonneville Power Administration's (BPA) hvdc Test Facility at The Dalles, Oregon. The transmission lines were operating at voltages from +- 400 to +- 600 kV during the field studies. The downwind ozone plumes were studied using a roving vertical profiling system. Ambient meteorological and test line parameters were also recorded to allow comparison of predicted and observed ozone plumes. For fair weather conditions no ozone plumes were evident. The absence of identifiable changes in ozone concentrations by the energized lines demonstrates the trivial nature of the ozone concentrations from the energized lines for fair weather conditions. Since corona loss from power lines is largest during precipitation, the ozone production is also largest. At the same time, the natural background atmospheric ozone concentrations are depressed by the scavenging effect of the precipitation. Therefore ozone production rates can best be measured during precipitation periods. With the exception of precipitation cases, the vertical profiles of ozone concentration demonstrated no discernible evidence of ozone plumes from the energized conductors. Ozone plumes, if any, were masked in the natural background ozone variability. (ERA citation 05:011856)

UCRL-50025-79-3 PC **A02**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Electronics Engineering Department. Quarterly Report No. 3, 1979.
30 Sep 79, 25p
Contract W-7405-ENG-48

Separate abstracts have been prepared for the four papers in this report. (ERA citation 05:014131)

9D. Information Theory

AD-A082 501/8 PC **A02**/MF **A01**
California Univ Los Angeles School of Engineering and Applied Science
Non-Linear White Noise Theory,
A. V. Balakrishnan. 1980, 14p AFOSR-TR-80-0176
Grant AFOSR-78-3550
Pub. in Multivariate Analysis, v5 p97-109 1980.

No abstract available.

AD-A082 537/2 PC **A02**/MF **A01**
University of Southern California Los Angeles Dept of Aerospace Engineering
Absolute Phase Demodulation,
R. S. Bucy, M. F. Moura, and A. J. Mallinckrodt.
1979, 5p AFOSR-TR-80-0069
Grant AFOSR-76-3100

No abstract available.

AD-A082 856/6 PC **A03**/MF **A01**
Massachusetts Inst of Tech Lexington Lincoln Lab
A New Algorithm for Adaptive Radar Signal Processing.
Technical note,
Darrol F. DeLong. 31 Dec 79, 48p TN-1979-72, ESD-TR-79-312
Contract F19628-80-C-0002

A new adaptive processing algorithm, called Weighted Covariance Estimation (WCE), for the detection of signals in interference of unknown character is presented. Its main advantage over present techniques, such as Sample MAtrix Inversion (SMI), is its tendency not to suppress desired signals present in the learning data. WCE and SMI are compared for a radar problem of practical interest, adaptive MTI from a moving platform, using both simulated and actual radar data. (Author)

PB80-810385 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.

Walsh Functions. 1964-April, 1980 (Citations from the NTIS Data Base).
Rept. for 1964-Apr 80,
Brian Carrigan. May 80, 114p
Supersedes NTIS/PS-79/0539 and NTIS/PS-78/0508.

Multidisciplinary applications of Walsh functions in signal processing are cited. Emphasis is placed on the use of Walsh functions in information theory, pattern recognition, image processing, data processing, and data transmission. The necessary software and numerical analysis are cited. (This updated bibliography contains 107 abstracts, 7 of which are new entries to the previous edition.)

9E. Subsystems

AD-A082 527/3 PC **A12**/MF **A01**
Syracuse Univ NY
Nonlinear System Analysis in Bipolar Integrated Circuits.
Phase rept. Sep 77-Oct 79,
Ta-Fang Fang, and James J. Whalen. Jan 80, 267p RADC-TR-79-324
Contract F30602-79-C-0011

Since analog bipolar integrated circuits (IC's) have become important components in modern communication systems, the study of the Radio Frequency Interference (RFI) effects in bipolar IC amplifiers is an important subject for electromagnetic compatibility (EMC) engineering. The investigation has focused on using the nonlinear circuit analysis program (NCAP) to predict RF demodulation effects in broadband bipolar IC amplifiers. The audio frequency (AF) voltage at the IC amplifier output terminal caused by an amplitude modulated (AM) RF signal at the IC amplifier input terminal was calculated and compared to measured values. Two broadband IC amplifiers were investigated: (1) a cascode circuit using a CA3026 dual differential pair; (2) a unity gain voltage follower circuit using a micro A741 operational amplifier (op amp). Before using NCAP for RFI analysis, the model parameters for each bipolar junction transistor (BJT) in the integrated circuit were determined. Probe measurement techniques, manufacturer's data, and other researcher's data were used to obtain the required NCAP BJT model parameter values. An important contribution included in this effort is a complete set of NCAP BJT model parameters for most of the transistor types used in linear IC's.

AD-A082 641/2 PC **A05**/MF **A01**
Northrop Corp des Plaines IL Defense Systems Div
Parametric Oscillations in High Power Microwave Amplifiers.
Final rept. Jul 77-Jun 79,
Gunter Dohler. 1979, 80p AFOSR-TR-80-0228
Contract F49620-77-C-0096

A Crossed Field Amplifier (CFA) model for parametric oscillations was developed which fulfills the basic requirements, empirically defines, for their existence; namely, the model requires their presence, preferably in overdrive conditions. The model then defines a fixed frequency f sub o located at the lower edge of the bandgap of the periodic slow wave structure, and predicts the simultaneous existence of a very-low-frequency oscillation. The existence of this low frequency oscillation has been verified experimentally. The presented model further predicts the power gain is obtained at low frequencies (f sub 1) and frequencies close to the bandgap (f sub 2). This power is obtained from the pump signal, and thus apparently from the second harmonic of the drive signal. The mathematical fundamentals of the model proposed for the traveling wave tube in terms of the coupled-mode theory was established. As in the case of the CFA, waves with three different frequencies were considered, which means that 6 waves will have to be tracked, 3 in each direction. The boundary conditions must then apply at each of the many interfaces between the empty and filled waveguide sections. (Author)

AD-A082 664/4 PC **A11**/MF **A01**
TRW Defense and Space Systems Group Redondo Beach CA Microelectronics Center
High Frequency Analog LSI Development.
Annual interim rept. no. 2, 1 Sep 78-12 Nov 79,
C. A. West, and J. Choma, Jr. 12 Nov 79, 248p
TRW-30491-6014-RU-00, NOSC-TR-517
Contract N00123-77-C-1045

This report documents all design and related analysis efforts undertaken in the second year of a three-year program aimed toward utilizing OAT fabrication technology to develop building block circuits which satisfy the system requirements of communication networks operating through L-band signal frequencies. The designs of a wideband RF amplifier, narrowband IF amplifier, four-quadrant analog multiplier, wideband operational amplifier, and high frequency voltage controlled oscillator are discussed at considerable depth, and the available experimental characterizations of these units are documented. As a prelude to circuit design discussions, the theories of bandwidth estimation, RF power flow, stability, and interstage coupling are rigorously developed and explained. These theories form the foundation upon which the circuit design methodology is structured. (Author)

AD-A082 726/1 PC **A02**/MF **A01**
Massachusetts Inst of Tech Lexington Lincoln Lab
Information Processing Techniques Program. Volume II. Acoustoelectric Devices.
Semiannual technical summary rept. 1 Apr-30 Sep 79,
John H. Cafarella, Richard W. Ralston, Stanley A. Reible, and Ernest Stern. 30 Sep 79, 18p
ESD-TR-79-280
Contract F19628-78-C-0002, ARPA Order-2929

This report describes work performed under the Acoustic Convolver program sponsored by the Information Processing Techniques Office of the Defense Advanced Research Projects Agency during the period 1 April through 30 September 1979. (Author)

AD-A082 759/2 PC **A02**/MF **A01**
RCA Government Communications Systems Camden NJ
Power Controller 28VDC Load Switching (N.O. SPST).
Final rept 31 Aug 77-21 Jan 80,
John B. McMackin. 21 Jan 80, 16p NADC-76-125-30
Contract N62269-77-C-0413

A solid state power controller has been designed in four ratings to switch 28vDC power to selected loads upon remote command. The four ratings trip out at currents of 10, 5, 2 and 1/2 amps. The design allows for wide variations in load and supply voltage and will not trip out on short load transients of up to 1000% of rated load current. In case of failure of the controller circuitry, an internal fuse protects the load from excessive current. The control current which operates the controller also provides a sensing function so that the state of the controller can be determined remotely. The controllers are designed to operate over a case temperature range of -54 C to 120 C. A quantity of 100 units have been fabricated, tested, and supplied to the Navy. (Author)

AD-A082 795/6 PC **A02**/MF **A01**
Naval Research Lab Washington DC
Double-Ended Backward-Wave Yagi Hybrid Antenna.
Walter K. Kahn. 15 Feb 80, 11p NRL-8377, AD-E000 384

A structurally simple antenna configuration, which offers lower sidelobe levels than a conventional Yagi, is described. The antenna combines a backward-wave excited array with a Yagi parasitically excited array of dipoles.

AD-A082 798/0 PC **A02**/MF **A01**
Naval Research Lab Washington DC
A Pattern-Synthesis Procedure for Regular Planar Arrays.
Interim rept.,
J. Paul Shelton. 14 Feb 80, 18p NRL-8368, AD-E000 386

The synthesis of radiation pattern functions for symmetric hexagonal arrays is considered. The concept of number of degrees of freedom in the array illumination is introduced, and the pattern characteristics of the seven-element array are developed. The relationship between multiplication of pattern functions and convolution of array illuminations is established. Synthesis techniques with zero and one degree of freedom are presented and demonstrated with examples. The technique with zero degrees of freedom generates hexagonal arrays which are analogous to linear arrays with binomial-coefficient illumination.

AD-A082 853/3 PC **A05**/MF **A01**
Massachusetts Inst of Tech Lexington Lincoln Lab
A UHF Test Simulator for an Antenna Nulling System.
Technical note,
William C. Cummings, Thomas P. Robbio, William C. Provencher, John E. Drover, and Madhu Singhal. 7 Jun 79, 84p TN-1979-8, ESD-TR-79-157
Contract F19628-78-C-0002
See also Rept. no. TN-1979-12.

A UHF Test Simulator designed for use in testing adaptive antenna array nulling systems is described. The simulator consists of two major components: a Jammer Simulator and an Antenna Array Simulator. The Jammer Simulator can simulate up to eight independent jammers. The Array Simulator can simulate an array of eight elements in a four jammer environment. Operating details of both these simulators is discussed. (Author)

AD-A082 854/1 PC **A05**/MF **A01**
Massachusetts Inst of Tech Lexington Lincoln Lab
Wideband Adaptive Antenna Nulling Using Tapped Delay Lines.
Technical note,
Joseph T. mayhan, Alan J. Simmons, and William C. Cummings. 26 Jun 79, 91p TN-1979-45, ESD-TR-79-162
Contract F19628-78-C-0002

For some applications, it is desirable to have an antenna which can adaptively form antenna pattern 'nulls' in the directions of a collection of interference sources. These nulls are generally required to be below some specified level of directive gain over the entire system bandwidth. Typically the nulls are formed by adaptively weighting each output of an N-port antenna, such as an N-element array. For large arrays operating over wide percentage bandwidths, some sort of frequency compensation is required at each output port to accomplish broadband nulling. One technique commonly used is to employ a 'tapped' delay line at each element output, with controllable weights (frequency independent) at the output of each tap. The objective of this report is to develop some insight into the way in which delay line compensation leads to improved performance, to develop some quantitative estimates of how performance varies with antenna and delay line parameters, and to develop some tools useful in the performance evaluation of frequency dependent weighting. Practical considerations dictate that only a minimum number of taps/element be utilized. A primary consideration is to minimize the number of taps required for a specific system performance. With this objective in mind, we develop an analytic solution characterizing the two element array, employing a two-tap delay line with each element. This provides valuable insight into the mechanism of delay line compensation.

AD-A082 855/8 PC **A03**/MF **A01**
Massachusetts Inst of Tech Lexington Lincoln Lab
An Extremely Light-Weight UHF Dipole Array for Satellite Applications.
Technical note,
Charles A. Lindberg. 11 Dec 79, 29p TN-1979-80, ESD-TR-79-282
Contract F19628-80-C-0002

The development of an extremely light-weight, circularly-polarized crossed-dipole UHF antenna array is described. Performance characteristics of the array measured on a full-scale model including gain and VSWR curves are provided. Weighing only four pounds, the array provides a nominal 13 dB gain in the 290-400 MHz band. The unit's light weight and durability makes it very attractive for use in satellite application. (Author)

AD-A082 859/0 Not available NTIS
Toronto Univ (Ontario) Dept of Electrical Engineering

A Charge-Transfer-Device Logic Cell,
T. D. Mok, and C. A. T. Salama. 13 Feb 74, 10p
DRB-REPRINT-4074
Availability: Pub. in Solid-State Electronics, v17 p1147-1154 1974 (No copies furnished by DTIC). Availability: Microfiche copies only.

No abstract available.

AD-A082 926/7 PC **A16**/MF **A01**
Raytheon Co Bedford MA Missile Systems Div
Reliability Evaluation of Low Power Schottky Clamped Microcircuits.
Final technical rept. Sep 77-Oct 79,
K. B. Lasch, D. Bartels, J. J. Spinale, and P. H. Ackroyd. Feb 80, 367p RADC-TR-80-5
Contract F30602-77-C-0186

An evaluation study has been completed on T2L Schottky integrated circuits of medium to large scale integration. The study consisted of electrical and physical characterization, step stress and accelerated long term testing, failure analysis and failure rate determination. The objective of this study was to verify the suitability of these devices for incorporation in advanced digital military systems. Five device types were selected and each was procured from two manufacturers. Device selection was based upon the availability of the MIL-M-38510 slash sheet at the time of selection, and manufacturer selection was based upon his offering the greatest number of the devices selected. In all, in excess of 1000 devices from four different manufacturers were included in the study. Electrical characterization was accomplished on computer-based test systems augmented by bench testing of transfer characteristics and thermal resistance.

AD-A082 932/5 PC **A02**/MF **A01**
Army Aviation Research and Development Command St Louis MO
Development of a Low-Cost Field Fix for the RU-21H Aircraft Antenna.
Technical memo.,
I. E. Figge. Feb 80, 24p Rept no. USAAVRADCOM-TM-80-D-4

A low-cost field fix for the RU-21H (Guardrail) aircraft antenna was developed, tested, and installed on a fleet of RU-21H aircraft to prevent catastrophic failure of the antennas, which was occurring in the field between 500 and 1000 hours of operation. The fix, consisting of a glass reinforced injection molded Acetate Butyl Styrene (ABS) cuff, was installed using the existing bolt pattern on the flange of the antenna. It cost approximately $25 per antenna and could be installed in approximately 30 minutes, as compared to an existing two-piece fix with an estimated cost of $1300 per antenna and requiring approximately a five-week downtime per aircraft. The cuff fix has been operational for approximately three years, and to date there are no known failures. Testing indicated that the cuff fix could be used to repair antennas with cracks up to 1 inch in length. During installation of the cuff, a second failure mode was observed on those antennas located near the engine nacelles. A longitudinal stiffener bonded along the length of the antenna was designed, evaluated, and installed, eliminating this problem. (Author)

AD-A082 999/4 PC **A03**/MF **A01**
Army Materiel Development and Readiness Command Adelphi MD Countermeasures/Counter-Countermeasures Office
Adaptive Antenna Systems.
Technical rept.,
Don J. Torrieri. Dec 79, 29p Rept no. CM/CCM-79-4

The basic principles of adaptive antenna systems are reviewed. Special attention is given to the sidelobe canceller--the prototype and classic example of adaptive antenna systems. The operation of the sidelobe canceller is interpreted in terms of noise cancelling and adaptive null steering. The classical theory of adaptive elements is developed. Tapped-delay-line and frequency-domain array-processing filters are discussed. The signal-to-noise ratio and the mean-square-error performance criteria are distinguished. The general theory of adaptive noise cancelling is linked to the sidelobe canceller, the classical theory of adaptive elements, and the adaptive notch filter. An adaptive antenna system is derived from the constrained minimum power criterion, which limits the cancellation of the desired signal. (Author)

AD-A083 003/4 PC **A03**/MF **A01**
Ohio State Univ Columbus Electroscience Lab
An Aperture-Matched Horn Design.
Technical rept.,
W. D. Burnside, and C. W. Chuang. Jan 80, 38p Rept no. ESL-710816-5
Contract N00014-78-C-0049

A novel horn design is presented in this report which provides significantly better performance in terms of the pattern, impedance and frequency characteristics than normally obtainable. The modification necessary to accomplish these improvements is achieved with a moderate increase in the size and weight; yet, the overall cost of design ad construction need not significantly increase. The basic concept utilizes an ordinary horn except that curved surface sections are attached to the outside of the aperture edges. Although all of the original studies associated with this new antennas were made using elliptic cylinder sections, they can be arbitrary smooth convex shapes which are attached to the horn such that the junction forms a smooth surface to the touch. (Author)

PAT-APPL-6-105 839 PC **A02**/MF **A01**
Department of the Army Washington DC
Individual Lead Pull Test for Beam Leaded Devices.
Patent Application,
Richard M. Wootten, and Jake Herron, Jr. Filed 20 Dec 79, 7p AD-D007 100/1
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

The present technology involving the testing of beam-lead devices deals with the 'push-off' testing of the entire bonding of the multiplicity of leads at one time. This technology involves the use of a special substrate arranged such that a hole is directly under the bonded beam-lead device in order to allow the 'push-off' test to be accomplished. In accordance with this invention, a method for destructive testing of beam-leaded devices is provided in which a ceramic chip of a beam-leaded integrated circuit is cut with a laser to segment a portion of the ceramic chip with each individual beam-lead, then cutting a hole with the laser through each individually cut chip section and then attaching a hook of a gram pull tester in the hole of each individual chip section and pulling on the tester until the bond between the individual beam lead and the conductor to which each individual beam lead is connected is broken or the beam lead itself is broken to test the bond strength of each individual beam-lead to its respective conductor. In this manner, the bond strength of each individual beam-lead to its respective conductor is accurately tested to determine the sufficiency of the bond strength of each individual lead.

PAT-APPL-6-106 983 PC **A02**/MF **A01**
Department of the Army Washington DC
Method and Apparatus for Non-Destructive Testing of Beam-Lead Integrated Circuit Connections.
Patent Application,
Jimmy D. Merrell. Filed 26 Dec 79, 7p AD-D007 099/5
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

The presently known technology involving the testing of beam-lead devices deals with destructive testing such as the 'Push-Off' testing of the entire bonding of the multiplicity of leads at one time or by other destructive methods. The 'Push-Off' technology involves the use of a special substrate arranged such that a hole is directly under the bonded beam-lead device in order to allow the 'Push-Off' test to be accomplished. In accordance with this invention, a method and apparatus for non-destructive testing of beam-leaded devices is provided in which each individual lead of the beam-leaded device has a pull tab with a weakened area thereon in order to provide a non-destructive means for testing the beam-leads. The beam-lead device is tested by inserting a hook of a gram pull tester into an opening of the tab and pulling on the tab until the weakended area is broken. The weakened area is selected such that it will break when subjected to a predetermined pull and this predetermined amount being less than that required to break the tensil strength of the diffusion bond between the beam-leads and the conductors to which they are connected. In this manner, the bond strength of each individual beam-lead to its respective conductor is accurately tested in a non-destructive manner to determine the sufficiency of the bond strength of each individual lead.

PAT-APPL-6-114 547 PC **A02**/MF **A01**
Department of the Army Washington DC
Interference Canceling System.
Patent Application,
Frank S. Gutleber. Filed 23 Jan 80, 10p AD-D007 096/1
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

The described system utilizes a pair of antenna beam patterns, one of which is adapted to provide the desired signal and all interfering signals, and the other of which is adapted to provide only the interfering signals. The patterns are then combined to produce substantially only the desired signal as the combined output. As is well known and understood, one of the major concerns of designers of antenna system communication links is the elimination or reduction of external interference sources, such as jamming, self-interference, atmospheric noise, man-made noise, and acoustic noise. As is also well known, most of the arrangements which attempt to resolve these problems of external interference do so in a relatively complex manner, often times utilizing very large directional antennas and/or with antennas having hundreds, or even more, elements. This problem of external interference is especially prevalent in the area of mobile communications systems where omnidirectional antennas are employed, because of the large numbers of users operating in the same frequency band and because of multipath. Use of very large directional antennas in such mobile arena will be seen to be almost a physical impossibility, and an economic impracticality.

PAT-APPL-6-128 343 PC **A02**/MF **A01**
Department of the Air Force Washington DC
Loss-Free Scanning Antenna.
Patent Application,
Jacques Renau. Filed 7 Mar 80, 12p AD-D007 118/3
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

Described is a system for, and a method of, scanning a collimated beam of electromagnetic radiation with a very large primary reflector of an antenna system without loss (i.e., with zero phase error) and without moving the primary reflector. The system is a two dimensional scan, loss-free, Cassegrain antenna system which comprises a stationary, parabolic-shaped, primary reflector, and a smaller, movable, parabolic-shaped subreflector, and also a movable, plan wave, electromagnetic radiation beam source interposed between the two reflectors.s It is shown that, without moving the primary reflector, the beam can be scanned over wide angles with no phase error in the plane of scan, provided that the source and the subreflector are rotated about the focal point of the antenna in a specific manner. A unique angular relationship between the source and the subreflector is required for each scan angle, and is taught. The method includes the step of using this antenna system in scanning the beam from the primary reflector, without any phase error and without moving the primary reflector. (Author)

PAT-APPL-6-132 452 PC **A02**/MF **A01**
Department of the Air Force Washington DC
Large Dynamic Range Low Distortion Amplitude Modulation Detector Apparatus.
Patent Application,
Daniel J. Healey, III. Filed 21 Mar 80, 15p AD-D007 119/1
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

The present invention utilizes an amplitude modulation detector having a pair of balanced diode rec-

tifiers to detect amplitude modulation at rates approaching the carrier frequency without diagonal clipping. A forward biasing circuit provides a trickle current to the balanced diode circuit which improves rectification at very low levels and increases the detector linearity over a wide input signal range. The biasing circuit utilizes matched pairs of diodes and operational amplifiers that exhibit a stiff bias voltage which changes with temperature in order to stabilize the current in the balanced diode rectifiers. The IF input signals to the amplitude modulation detector are applied to a pair of microwave RF power transistors which are selected for suitability in wide band negative feedback amplifier use with attendant low distortion. The output signals from the transistors are coupled to the balanced diode rectifiers through a low leakage reactance transformer that supplies peak IF voltages to the diode rectifiers with negligible envelope distortion. The signals from the rectifying diodes are filtered by a low pass filter to suppress unwanted frequency components.

PATENT-4 200 840 Not available NTIS
Department of the Air Force Washington DC
Dual Detection Scheme for Compressive Receivers.
Patent,
James B. Y. Tsui. Filed 6 Oct 78, patented 29 Apr 80, 6p AD-D007 162/1, PAT-APPL-949 284
Supersedes PAT-APPL-949 284-78, AD-D005 582.
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available Commissioner of Patents, Washington, DC 20231 $0.50.

Undesired spurious noise signals appearing in the dispersive delay line (DDL) of a compressive receiver are suppressed and the dynamic range of the receiver is significantly increased by utilizing parallel channels of processing in combination with a signal comparator. Each channel contains a different weighting filter which accordingly modifies the signal passing therethrough. The weighting filters are selected to produce a reversal as to the signal having the largest relative amplitude at a time nearly coincident with the main lobe of the DDL created pulse. Thereby, the comparator produces a square wave form pulse which is nearly coincident in time with the main lobe of the DDL pulse, yet suppresses the adjacent spurious side lobes of the signal being processed in the receiver. (Author)

PB80-169931 PC **A04**/MF **A01**
National Bureau of Standards, Washington, DC. National Engineering Lab.
Characterization of Electrically Small Radiating Sources by Tests Inside a Transmission Line Cell.
Ippalapalli Sreenivasiah, David C. Chang, and Mark T. Ma. Feb 80, 71p NBS-TN-1017
Prepared in cooperation with Colorado Univ., Boulder.

An electrically small radiating source of arbitrary nature may be modeled by an equivalent dipole system consisting of three orthogonal electric dipoles and three orthogonal magnetic dipoles, each excited with arbitrary phase. An experimental procedure for determining the emission characteristics of such an equivalent dipole system by tests inside a single-mode transmission line cell is described in this report, followed by some experimental results.

PB80-809676 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Band Pass Filters. February, 1977-April, 1980 (Citations from the NTIS Data Base).
Rept. for Feb 77-Apr 80,
William E. Reed. Apr 80, 249p
Supersedes NTIS/PS-79/0300 and NTIS/PS-78/0215. For the companion Published Searches of the Engineering Index Data Base, see NTIS/PS-79/0301 and PB80-809684. See also 1964-January, 1977, NTIS/PS-78/0214.

The design, fabrication, characterization, and application of band pass filters are investigated in the cited Federally-sponsored research reports. Radiofrequency, digital, acoustic surface wave, and x-ray filters are included. Optical filters are excluded. (This updated bibliography contains 242 abstracts, 68 of which are new entries to the previous edition.)

PB80-809684 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Band Pass Filters. 1978-February, 1980 (Citations from the Engineering Index Data Base).
Rept. for 1978-Feb 80,
William E. Reed. Apr 80, 241p
Supersedes NTIS/PS-79/0302 and NTIS/PS-78/0216. For the companion Published Searches of the NTIS Data Base, see NTIS/PS-78/0214 and PB80-809676. See also 1974-1977, NTIS/PS-79/0301.

The bibliography cites worldwide research on the design, fabrication, characterization, and application of band pass filters. Radiofrequency, electric, digital, and acoustic surface wave filters are included. Optical filters are excluded. (This updated bibliography contains 234 abstracts, 102 of which are new entries to the previous edition.)

SAND-79-1230 PC **A04**/MF **A01**
Sandia Labs., Albuquerque, NM.
Characterization of Digital Filters Used in Sandia Laboratories Test Data Analysis Division.
P. L. Walter, and R. Rodeman. Dec 79, 56p
Contract EY-76-C-04-0789

This report characterizes the digital filters used by the Test Data Analysis Division at Sandia Laboratories. Problems associated with designing filters to minimize errors introduced by the filters are discussed. (ERA citation 05:012387)

SAND-79-1479C PC **A02**/MF **A01**
Sandia Labs., Albuquerque, NM.
Latch-Up Control in CMOS Integrated Circuits.
A. Ochoa, W. Dawes, D. Estreich, and H. Packard. 13 Jul 79, 13p CONF-790706-7
Contract EY-76-C-04-0789
1979 IEEE Annual conference on nuclear and space radiation effects, Santa Cruz, CA, USA, 17 Jul 1979.

The potential for latch-up, a pnpn self-sustaining low impedance state, is inherent in standard bulk CMOS-integrated circuit structures. Under normal bias, the parasitic SCR is in its blocking state but, if subjected to a large voltage spike or if exposed to an ionizing environment, triggering may occur. This may result in device burn-out or loss of state. The problem has been extensively studied for space and weapons applications. Prevention of latch-up has been achieved in conservative design (approx. 9 mu m p-well depths) by the use of minority lifetime control methods such as gold doping and neutron irradiation and by modifying the base transport factor with buried layers. The push toward VLSI densities will enhance parasitic action sufficiently so that the problem will become of more universal concern. The paper will surveys latch-up control methods presently employed for weapons and space applications on present (approx. 9 mu m p-well) CMOS and indicates the extent of their applicability to VLSI designs. (ERA citation 05:012315)

UCID-18514 PC **A04**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
DASLL: User's Training and Procedures Manual.
W. G. Magnuson, Jr., and G. W. Willett. Dec 79, 56p
Contract W-7405-ENG-48

This manual is a brief description on how to use the DASLL system to lay out printed circuit boards. It covers how to prepare input, how to run DASLL on the OCTOPUS CDC 7600 computer system, and how to make the DASLL system output ready for final inspection. 16 figures. (ERA citation 05:014039)

UCRL-52822 PC **A03**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Imaging of Linear Source Distributions.
E. K. Miller, D. L. Lager, and J. T. Okada. Nov 79, 33p
Contract W-7405-ENG-48

An approach based on Prony's method is used to find the spatial poles of straight wires of varying length and radius from the far-field patterns. For the antenna case, poles having the largest residues are found near the feed region and antenna ends; smaller ones are found outside these regions. The poles are attributed to radiation from the exciting source and wire ends, due to charge acceleration, and from a slightly damped traveling wave. In the scattering case, the poles with the largest residues are located at the wire's ends for near-axial incidence and are again due to end radiation. By examination of the residue magnitudes as a function of wire radius, a correlation is found with radiation from the feed region of an infinite antenna and from the ends of a semi-infinite antenna. 19 figures. (ERA citation 05:014526)

10. ENERGY CONVERSION (NON-PROPULSIVE)

10A. Conversion Techniques

AD-A083 000/0 PC **A09**/MF **A01**
Defense Technical Information Center Alexandria VA
Solar Energy.
Report bibliography Jan 55-Sep 78,
Apr 80, 186p Rept no. DTIC/BIB-80/01
Supersedes Rept. no. DDC/BIB-77/03, AD-A038 600.

This bibliography is a selection of unclassified and unlimited distribution references on Solar Energy. These citations of reports present information on performance characteristics, fabrication, development of power levels and energy conversion. Four computer-generated indexes are provided. (Author)

AFMA-EF-13557-79-3 PC **A04**/MF **A01**
Meyer (A.F.) and Associates, Inc., McLean, VA.
Guidance for Implementing the Department of Energy's Safety Analysis and Review System in Fossil Energy Programs.
T. F. Hurley, and A. F. Meyer, Jr. Dec 79, 57p
Contract AC02-79ET13557

On March 20, 1979, the Department of Energy (DOE) promulgated Order 5481.1, Safety Analysis and Review System. That directive established uniform requirements for preparing and reviewing safety analyses for DOE operations. Its purposes were to identify hazards and means of eliminating or controlling them, to assess risks, and to document management's authorizations of the operations. The Assistant Secretary for Fossil Energy requested A.F. Meyer and Associates (AFMA), Inc. to begin a study which would result in recommended procedures for implementing the DOE-wide safety analysis and review system (SARS) in the Office of Fossil Energy Programs (FE). This technical report is the result of that study. (ERA citation 05:012687)

ALO-4231-09(V.1) PC **A03**/MF **A01**
American Technological Univ., Killeen, TX.
Fort Hood Solar Total Energy Project. Volume I. Executive Summary. Final Report.
Jan 79, 47p
Contract EM-78-C-04-4231

A summary of the history, design, performance, supporting activities, and management plans for the Solar Total Energy System for the troop housing complex at Fort Hood, Texas, is presented. (ERA citation 05:011638)

ALO-4231-09(V.4) PC **A05**/MF **A01**
American Technological Univ., Killeen, TX.
Fort Hood Solar Total Energy Project. Volume IV. Project Management Plan. Final Report.
Jan 79, 83p
Contract EM-78-C-04-4231

The Project Management Plan presented is designed to implement the definitive design phase of this project by establishing the organization, tasks, schedules, and controls to assure the accomplishment of project objectives within time and budgetary constraints. Specifically, the plan presents a

functional organization composed of a team of personnel with proven experience and capability; clear and concise methods for evaluation and control of project activities and costs; and a set of procedures that provides a means for sound and timely decisions and actions relative to project tasks and milestones. Since a significant portion of the overall design effort is to be performed by a subcontractor, Westinghouse Electric Corporation, this management plan, in conjunction with subcontract provisions, establishes a sound base for evaluation, control and coordination of all activities associated with their respective tasks. (ERA citation 05:011640)

ALO-4271-01 PC **A06**/MF **A01**
Aerospace Corp., El Segundo, CA. Energy and Resources Div.
Fort Hood Solar Total Energy Project. Technical Support and Systems Integration. First Semiannual Report, May 1-October 31, 1978.
1978, 119p ATR-79(7743)-1
Contract ET-78-C-04-4271

Progress on the design of a Solar Total Energy System which will supply a significant portion of the energy requirements of a troop housing complex at Fort Hood, Texas, is described. Selection and sizing of the distributed collector field are discussed, and parabolic trough collector technology is reviewed. Energy load measurements and insolation models for the Fort Hood site are described. Technical project support efforts are reviewed. (ERA citation 05:011641)

ATR-79(7747)-2 PC **A04**/MF **A01**
Aerospace Corp., El Segundo, CA.
Measurements of Insolation Variation over a Solar Collector Field.
30 Dec 78, 68p
Contract ET-78-C-03-2028

The experiment described in this report makes observations to determine the direct insolation every 16 sec at corners of a quadrilateral approximately 600 meters in size located near Barstow, California. This size approximates the collector field of the solar power plant to be built near Barstow. Data from the first three months of operation of this experiment indicate cloudy conditions, capable of affecting the operation of a solar power plant, occurred during 15% of the daylight hours of some months. Patterns of insolation variation over the experiment area indicate shadows often exist with dimensions less than the projected size of the collection field for the 10 MW/sub e/ solar thermal power plant. Detailed statistical summaries of four partly cloudy events are included. Rates of insolation change on an individual sensor greater than or equal to 30 Wm exp -2 sec exp -1 have been observed, but these rate measurements have probably been limited by the response time of the experimental system. Spatial averaging of the measured insolation over the sensor field lowers the rate of insolation change. (ERA citation 05:011428)

BNL-50903 PC **A07**/MF **A01**
Brookhaven National Lab., Upton, NY.
Annual Fuel Usage Charts for Oil-Fired Boilers.
A. L. Berlad, Y. J. Yeh, F. J. Salzano, R. J. Hoppe, and J. Batey. Jul 78, 141p
Contract EY-76-C-02-0016

On the basis of laboratory-determined boiler efficiency data, one may calculate the annual fuel usage (AFU) for any oil-fired boiler, serving a structure of a given design heat load, for any specified hourly weather pattern. Further, where data are available regarding the energy recapture rates of the strucutre due to direct gain solar energy (windows), lighting, cooking, electrical appliances, metabolic processes, etc., the annual fuel usage savings due to such (re) capture are straightforwardly determinable. Employing the Brookhaven National Laboratory annual fuel usage formulation, along with efficiency data determined in the BNL Boiler Laboratory, computer-drawn annual fuel usage charts can be generated for any selected boiler for a wide range of operating conditions. For two selected boilers operating in any one of the hour-by-hour weather patterns which characterize each of six cities over a wide range of firing rates, domestic hot water consumption rates, design heat loads, and energy (re) capture rates, annual fuel usages are determined and graphically presented. Figures 1 to 98, inclusive, relate to installations for which energy recapture rates are taken to be zero. Figures 97 to 130, inclusive, apply to a range of cases for which energy recapture rates are nonzero and determinable. In all cases, simple, direct and reliable annual fuel usage values can be determined by use of charts and methods such as those illustrated. (ERA citation 05:012070)

BNL-50940 PC **A04**/MF **A01**
Brookhaven National Lab., Upton, NY.
Demand Elasticity Representation: Methodology and Calibration.
A. S. Kydes. Jul 79, 51p
Contract EY-76-C-02-0016

This paper describes the methodology incorporated within a version of the Brookhaven Energy System Optimization Model (BESOM) to yield first-order approximations of the response of a national energy system, in economic equilibrium, to changes in prices, quantity of fuel available, and changes in the technological structure of the energy-conversion devices - including efficiency changes. The methodology is not intended as a substitute for the comprehensive energy-economic analysis derivable from the BNL Dale Jorgenson Associates suite of models. It is intended as an inexpensive tool for performing firsr-order sensitivity of energy systems around an established energy-economic equilibrium point. (ERA citation 05:011985)

CONF-790897-1 PC **A03**/MF **A01**
Argonne National Lab., IL.
Cultural Resources and Tradition: The Consequences of Their Evaluation for Socioeconomic Impact Assessment.
S. A. Curtis. 1979, 27p
Contract W-31-109-ENG-38
Annual American Sociological Association meeting, Boston, MA, USA, 27 Aug 1979.

The use of cultural resource data to improve the content and quality of the standard Environmental Impact Statement (EIS) socioeconomic profile and impact sections is illustrated. Emphasis is placed on an approach for identifying some kinds of potentially disruptive sociocultural changes in rural communities and ethnic groups that may be brought about by energy developments. The report is divided into three parts. Part one reviews the legislative reason for the EIS and problems with the current implementation of many socioeconomic studies. Part two explores how and why clutural resource data can be made meaningful for the EIS community studies and provides two case examples. Part three presents information for those who are not experts in cultural-resource management for quality control of usable culturalresource information. (ERA citation 05:012540)

CONS-0261-T1 PC **A09**/MF **A01**
Mathematical Sciences Northwest, Inc., Bellevue, WA.
Estimating Energy Impacts of Residential and Commercial Building Development. A Manual for the Pacific Northwest and Alaska.
22 Feb 79, 178p
Contract EW-78-C-51-0261

This energy-impact manual presents information on energy implications of new building design and operation, providing a reasonably accurate means of assessing the total energy impact of new construction in the commercial and residential sectors. While developed specifically for the states of Alaska, Idaho, Oregon, and Washington, much of the data used are national averages; the procedures described are applicable to other regions of the nation, with appropriate adjustments for climatic differences. The manual is organized into three parts, each covering one aspect of the energy impacts of building development. Part I addresses the energy impact of erecting the building(s). This includes the energy cost of grading and excavating and other site preparation. It also takes into account the energy embodied in the fabrication of materials used in building construction, as well as the energy cost of transporting materials to the site and assembling them. Part II focuses on the end use of energy during normal building operation, i.e., the energy consumed for space heating, cooling, lighting, water heating, etc. A simplified calculation sequence is provided which allows the user to estimate the consumption of most combinations of building orientation, characteristics, and operating conditions. Part III examines the relationship of land use to energy consumption, principally the transportation energy impact of various land-development patterns, the embodied energy impacts of infrastructure requirements, and the impacts of various orientation and siting schemes. (ERA citation 05:013727)

CONS-3784-T1 PC **A99**/MF **A01**
National Academy of Sciences, Washington, DC.
Energy in Transition, 1985-2010. Final Report of the Committee on Nuclear and Alternative Energy Systems, National Research Council.
1979, 820p
Contract EX-76-C-10-3784

This exhaustive study, in assessing the roles of nuclear and alternative energy systems in the nation's energy future, focuses on the period between 1985 and 2010. Its intent is to illuminate the kinds of options the nation may wish to keep open in the future and to describe the actions, policies, and R and D programs that may be required to do so. The timing and the context of these decisions depend not only on the technical, social, and economic features of energy-supply technologies, but also on assumptions about future demand for energy and the possibilities for energy conservation through changes in consumption patterns and improved efficiency of the supply and end-use systems. The committee developed a three-tiered functional structure for the project. The first tier was CONAES itself, whose report embodies the ultimate findings, conclusions, and judgments of the study. To provide scientific and engineering data and economic analyses for the committee, a second tier of four panels was appointed by the committee to examine (1) energy demand and conservation, (2) energy supply and delivery systems, (3) risks and impacts of energy supply and use, and (4) various models of possible future energy systems and decision making. Each panel in turn established a number of resource groups - some two dozen in all - to address in detail an array of more particular matters. Briefly stated, recommended strategies are: (1) increased energy conservation; (2) expansion of the nation's balanced coal and nuclear electrical generation base; (3) retention of the breeder option; (4) stimulation of fluid energy development; and (5) immediate increase in research and development of new energy options to ensure availability over the long term. (ERA citation 05:012023)

COO-4094-74 PC **A02**/MF **A01**
Massachusetts Inst. of Tech., Lexington. Lincoln Lab.
Comparison of Theory and Experiment for Photovoltaic/Thermal Collector Performance.
S. D. Hendrie. 1980, 7p CONF-800106-15
Contract EY-76-C-02-4094
14. photovoltaics specialists conference, San Diego, CA, USA, 7 Jan 1980.

Detailed performance testing of an air and a liquid type combined photovoltaic/thermal (PV/T) collector has been completed with results of accompanying analytical modeling accurately predicting the experimental data. Thermal efficiencies, with concurrent photovoltaic operation at the maximum power point, are computed in accordance with ASHRAE 93-77 specifications and collector-surface heat-transfer coefficients are determined. Analytical modeling of the two collectors from first principals accounts for the non-ideal bonding of photovoltaic cells to the thermal collector components and for the spacing between cells. (ERA citation 05:011438)

COO-4462-1 PC **A05**/MF **A01**
Great Lakes Research Corp., Elizabethton, TN.
Rotary Kiln Waste Energy Recovery and Conversion. Final Report, August 1, 1977-September 30, 1978.
W. R. Benn, F. T. Fitch, and G. H. Stecker. Oct 78, 81p
Contract EC-77-C-02-4462

Energy recovery, conversion and energy-intensive consuming processes were studied. Waste heat from the rotary kiln calcining of petroleum coke at two plant sites, Enid, Oklahoma and Port Arthur,

Texas, was quantified in the study. Potential consumers were canvassed. Prospects for conservation projects are promising. Recommendations and other conclusions are described. (ERA citation 05:012123)

COO-4954-1(V.3) PC **A10**/MF **A01**
United Engineers and Constructors, Inc., Philadelphia, PA.
Energy Economic Data Base (EEDB) Program: Phase I. Final Report and Initial Update.
Dec 79, 210p
Contract EN-78-C-02-4954

Volume I describes the EEDB and presents some pertinent update material. The initial appendices make up Volume II in which descriptions of the Standard Hypothetical Middletown Sites for nuclear power plants and coal-fired power plants are presented. Additional data in appendices in Volume II include information on NUS Corporation fuel-cycle work; inflation-free fixed charge rates; capital cost update procedure; and Combustion Engineering, Inc. LMFBR NPGS Target nuclear steam supply system. This Volume, III, contains additional appendices entitled: Practical Target Economics for the Liquid Metal Fast Breeder Reactor Nuclear Power Generating Station; Air-Quality Impact Analysis for Determination of the Acceptability of Qualified High- and Low-sulfur Coal-Fired Facility Designs for the Hypothetical Middletown Site; Synthetic Power Plant Fuels by the Solvent Refined Coal Process; Inflation-Free Fuel Cycle Costs for Throwaway and Recycle Cases; Inflated (6%) Fuel Cycle costs for Throwaway and Recycle Cases. Inflated (7%) Fuel Costs for Throwaway and Recycle Cases; Inflated (8%) Fuel Cycle Costs for Throwaway and Recycle Cases; Fuel Costing Methodology; and Bred-Fuel Scenarios. (ERA citation 05:013661)

COO-4996-1 PC **A03**/MF **A01**
GTE Labs., Inc., Waltham, MA.
Development of Materials for a Luminescent Solar Collector. Annual Progress Report, September 1, 1978-August 31, 1979.
A. Lempicki, L. Andrews, and B. C. McCollum.
1979, 42p
Contract ER-78-C-02-4996

The objectives of the research involved preparation of a number of Cr exp 3+ doped glasses beginning with common commercial types, and expansion of the number and variety of glasses as time allowed. The Cr exp 3+ doped glasses have been evaluated by spectroscopic measurements which have included absorption and emission as well as quantum yield determinations. In addition, the influence of concentration quenching was measured by studying the luminescence decay kinetics at various concentrations in a variety of glasses. As the program developed, and the problem of rather low quantum yields became apparent in all the glasses, a rather detailed investigation was undertaken to better understand the radiationless decay of Cr exp 3+ in order to best evaluate the future direction of the program. The results are summarized. (ERA citation 05:013382)

COO-5011-5 PC **A02**/MF **A01**
Portland Cement Association, Skokie, IL. Construction Technology Labs.
Sulfate Specifications as a Constraint to Gypsum Addition to Cement and Possible Replacement of Gypsum as an Additive. Quarterly Technical Progress Report, September-November 1979.
D. L. Kantro. 1979, 8p
Contract EW-78-C-02-5011

If limitations on sulfate content in cements were made less restrictive, it should prove possible to use kiln fuels with higher sulfur contents and to employ energy-efficient modern preheater kiln technology without risk of exceeding sulfate specifications in the finished product. This would save energy and reserve low sulfur coal for more essential applications. In order to provide a basis for reconsidering the limitations currently imposed on sulfate contents in cements for reasons of soundness, comprehensive data are being developed in this research project on: potential alternatives to gypsum for controlling set in commercial concretes; additives to deter sulfate-induced expansion; and the influence of clinker manufacture on expansion potential in cements. The basic hydration characteristics common to the various mixtures of C sub 3 A or C sub 4 AF with calcium hydroxide and calcium and alkali sulfates have been delineated. X-ray diffraction analyses and free lime determinations for the various test clinkers have been completed. Drying shrinkage results have been obtained for the higher carbonate-content mortars previously described. The results indicate no adverse effect due to carbonate substitutions for up to 10% cement. (ERA citation 05:013789)

DOE/CR-0010 PC **A05**/MF **A01**
Department of Energy, Washington, DC.
U.S. Department of Energy Project Book.
Jan 80, 36p

This book covers representative projects in each program within the Department of Energy. The projects included were selected to provide an insight into the wide spectrum of projects authorized and under way in the Department. The projects described do not cover all projects authorized - they are merely representative. Descriptions, goals, and status are given for 29 energy projects, 4 scientific projects, and 5 defense projects. (ERA citation 05:010197)

DOE/CS-0116 PC **A12**/MF **A01**
Department of Energy, Washington, DC.
Proposed Energy-Performance Standards for New Buildings: Climate Classification Analysis. Technical Support Document.
Nov 79, 258p

The objectives and findings of the climate classification analysis conducted by DOE in support of the program to develop the energy-conservation standards for new buildings are summarized. The analysis addresses the relationships between weather variables and the design energy requirements of buildings. An equitable climate classification system to develop, present, and apply the standards is defined. The climate classification system is based on an evaluation of the geographic variation in building DER estimates, using the methodology discussed in Section 2.0. Initially, seven climate regions, based on heating and cooling degree-days, were seven developed as a statistical stratification device. These seven regions were presented in the Advance Notice of Proposed Rulemaking on the standards, published in the FEDERAL REGISTER on November 21, 1978. Since then, DOE has oriented an ongoing research effort toward a more equitable climate-classification system. The research effort to date has included an assessment of both the effectiveness with which degree-days explained geographic variations in DER and the effectiveness of other climate variables (such as solar insolation, humidity, etc.) in explaining such variations, either independently or in conjunction with temperature-based variables. (ERA citation 05:010240)

DOE/CS-0121 PC **A04**/MF **A01**
Department of Energy, Washington, DC. Office of Conservation and Solar Applications.
Proposed Energy Performance Standards for New Buildings: Draft Regulatory Analysis. Technical Support Document.
Nov 79, 59p

DOE's proposed energy-performance standards for new buildings have been developed in accordance with the Energy Conservation Standards for New Buildings Act of 1976 (Title III of P.L. 94-385, 42 U.S.C. 6831 et seq.) and Secton 304 of the DOE Organization Act, P.L. 95-91, 91 Stat. 965 et seq., 42 U.S.C. 7101 et seq. The Regulatory Analysis for the proposed standards discusses major alternatives to the regulation, examines the economic and administrative effects of each alternative, and explains why one alternative was selected over the others. The standards, which affect new buildings only, will require those buildings to be designed for greater energy efficiency than their present-day counterparts. The standards will not regulate the actual energy consumption of the building once constructed and in use. In the long term, the presence of these energy-efficient buildings will reduce the amount of additional nonrenewable energy that the nation will need. In the short term, these more-efficient buildings will reduce the impact of rising energy costs on new-building owners. (ERA citation 05:012074)

DOE/CS/20158-T1 PC **A03**/MF **A01**
Dynatrend, Inc., Arlington, VA.
Development of a Risk Analysis Model. Appendix C. Risk Analysis Methodology. Final Report.
Oct 79, 34p
Contract AC03-77CS20158

Three case studies were included in the process of the contract effort. This appendix provides general information concerning the model used in the three case studies, its input data requirements, and its output reports. This appendix should be used in conjunction with each of the separately bound case studies: Appendix D, Gas Fired Heat Pump Case Study; Appendix E, 1000 Ton Per Day Anaerobic Digestion Plant Case Study; and Appendix F, District Heating and Cooling System Case Study. (ERA citation 05:011986)

DOE/CS/20158-T2 PC **A06**/MF **A01**
Dynatrend, Inc., Arlington, VA.
Development of a Risk Analysis Model. Appendix F. District Heating and Cooling System Case Study. Final Report.
Oct 79, 111p
Contract AC03-77CS20158

The risk analysis reported in this appendix was concerned with a business venture in the area of district energy systems using thermal energy cogenerated at existing electric power plants. After an introductory section, Section 2, Institutional Issues, discusses investment decisions and regulatory constraints and issues; Section 3 reviews public utility company objectives and investment analysis approach; Section 4 reviews the case study of district heating and cooling systems (DHCS) in Washington, DC; Section 5 results of the Minneapolis/St. Paul case DHCS study; Section 6 summarizes the desired risk-analysis methodology for evaluating regulated utility investment decisions; and Section 7 presents overall conclusions. (ERA citation 05:011987)

DOE/EIA-0186 PC **A10**/MF **A01**
Department of Energy, Washington, DC. Energy Information Administration.
Multiyear Program Plan for the Office of Applied Analysis.
4 Jun 79, 208p

The Office of Applied Analysis of the DOE Energy Information Administration is charged with the responsibility of forecasting and analyzing the effects and impacts of energy-related events and policies. The Applied Analysis Program Plan has two objectives. First, it is intended to serve as a management tool for planning the direction of program objectives and projects, tracking estimated timeframes, and managing resources. Second, it lays out in a comprehensive fashion the Office's overall mission, ongoing activities, measurable objectives, and resource allocation over the next few years as currently planned. Applied Analysis is divided into 7 program areas with relevant subprograms associated with each program. Major directions that are planned are first discussed briefly, followed by details on the 7 programs, namely: Analysis Management; Analysis Oversight and Access; Energy Source Analysis; Energy Use Analysis; Energy Market Analysis; Energy Economy Analysis; and Energy Industry Analysis. Finally, six appendices expand on material appearing in the program plans, list relevant legislative citations, and summarize broad operating principles and policies. (ERA citation 05:011988)

DOE/EIA-0194/7 PC **A17**/MF **A01**
ICF, Inc., Washington, DC.
Alaskan Hydrocarbons Supply Model: Methodology Description. Appendix I. Data Documentation.
12 Oct 79, 386p

This report is one of a series documenting the Alaskan Hydrocarbons Supply Model. The model is used to develop midterm projections of oil and gas supply for offshore and onshore regions in Alaska. This data documentation provides data sources, describes any manipulation of the data required to put the data in the proper form, and lists the actual data used in the development of the model. (ERA citation 05:013051)

DOE/EIA/6345-T1 PC **A07**/MF **A01**
Urban Systems Research and Engineering, Inc., Cambridge, MA.

Direct Regional Energy/Economic Modeling (DREEM) Design.
P. D. Hall, and C. J. Pleatsikas. Oct 79, 146p
Contract EI-78-C-01-6345

This report summarizes an investigation into the use of regional and multiregional economic models for estimating the indirect and induced impacts of Federally-mandated energy policies. It includes an examination of alternative types of energy policies that can impact regional economies and the available analytical frameworks for measuring the magnitudes and spatial extents of these impacts. One such analytical system, the National Regional Impact Evaluation System (NRIES), currently operational in the Bureau of Economic Analysis (BEA), is chosen for more detailed investigation. The report summarizes the models capabilities for addressing various energy policy issues and then demonstrates the applicability of the model in specified contexts by developing appropriate input data for three scenarios. These scenarios concern the multi-state impacts of alternative coal-mining-development decisions, multi-regional impacts of macroeconomic change, and the comprehensive effects of an alternative national energy supply trajectory. On the basis of this experience, the capabilities of NRIES for analyzing energy-policy issues are summarized in a concluding chapter. (ERA citation 05:011989)

DOE/ER-0035 PC **A07**/MF **A01**
Department of Energy, Washington, DC. Office of Energy Research.
Review of the Management of Materials Research and Development in the Department of Energy. Final Report.
Dec 79, 134p

The Materials Working Group of DOE findings and recommendations of a management nature to improve the handling of materials R and D within DOE are presented. The special role of materials in the development of new energy technologies is provided. (ERA citation 05:012172)

DOE/NASA/CR-161253 PC **A02**/MF **A01**
Wyle Labs., Huntsville, AL. Solar Energy Systems Div.
Thermal Performance Evaluation of the Suncatcher SH-11 (Liquid) Solar Collector.
Jul 79, 22p
Contract EX-76-A-29-1037

This report contains the procedures used and the results obtained during the evaluation test program on the Solar Unlimited, Inc., Suncatcher SH-11 (Liquid) Solar Collector. The flat-plate collector case assembly is made of .08 inch aluminum 3003 H14 rivited with fiberglass board insulation. The absorber consists of collared aluminum fins mechanically bonded to 3/8 inch copper tubing and coated with 3M "Nextel" black. Water is used as the working fluid. The glazing is made of a single glass, 1/8 inch water white, tempered and antireflective. The collector weight is 85 pounds with overall external dimensions of about 35.4" x 82.0" x 4.0". The test program was conducted to obtain thermal performance data on the Solar Unlimited Suncatcher SH-11 solar collector under simulated conditions. These tests were conducted using the MSFC Solar Simulator. (ERA citation 05:009991)

DOE/NASA/1060-79/3 PC **A02**/MF **A01**
National Aeronautics and Space Administration, Cleveland, OH. Lewis Research Center.
Potential Performance Improvement Using a Reacting Gas (Nitrogen Tetroxide) as the Working Fluid in a Closed Brayton Cycle.
R. J. Stochl. Dec 79, 24p NASA-TM-79322
Contract EX-76-A-29-1060

The results of an analysis to estimate the performance that could be obtained by using a chemically reacting gas (nitrogen tetroxide) as the working fluid in a closed Brayton cycle are presented. Compared with data for helium as the working fluid, these results indicate efficiency improvements from 4 to 90 percent, depending on turbine inlet temperature, pressures, and gas residence time in heat-transfer equipment. This concept could be attractive for solar thermal power applications. (ERA citation 05:013319)

DOE/PE-0017 PC **A15**/MF **A01**
Department of Energy, Washington, DC. Assistant Secretary for Policy and Evaluation.
Renewable Energy Development: Local Issues and Capabilities.
Jan 80, 347p

More than 300 organizations responded to a DOE request seeking information from organizations interested in development of renewable energy sources and specifically, those organizations with the capability to perform innovative planning, research, and analysis for the development of renewable energy resources at the local, state, and regional level. The first chapter summarizes the broad characteristics of the responses into these areas: research, development, demonstration; socio-economic analysis; information collection and dissemination; technology transfer or assessment; education and training; systems or policy analysis; community development; program planning; architectural design; and technical assistance. Additional chapters are: Respondents' Issues and Concerns; Using the Respondents' Capabilities; and Detailed Capabilities of Respondents. (ERA citation 05:011993)

DOE/SF/40225-T1 PC **A08**/MF **A01**
TRIAD and Associates, Inc., Corpus Christi, TX.
Shrimp Monitor/Locator for Conservation of Fuel. Final Report.
1 Jan 80, 151p
Contract EM-78-C-03-2170

A demonstration project of a new type Shrimp Detector/Monitor has been completed. The test project proved the efficiency of the Shrimp Monitor/Detector in detecting shrimp, in identifying the number and size, in real time, but indicated that improvement could be effected which would enhance the operation. Data obtained from the test cruises indicate significant savings in diesel fuel will occur for those trawlers using the Shrimp Monitor/Detector in place of the usual trynet operation; 25% savings for the series model number 400, (the prototype tested) and expected 35%+ if the advanced series model number 500 were used. Fabrication and operational costs for the Shrimp Monitor/Detector are reasonable and well within the financial abilities of the usual large offshore trawler. Research and testing during this program resulted in the design of an advanced model incorporating significant improvements, and fabrication was commenced but the extra cost involved beyond the set value of this contract made the further experiments non-viable. Recommendations have been submitted for an extended program to fabricate and test the advanced model series number 500 which may be of more value and interest, market use, to the operating offshore shrimp trawlers. A marketing/sales program will be instituted to place the Shrimp Monitor/Detector in the commercial area serving the shrimp fleet. (ERA citation 05:010294)

DOE/TIC-10269 PC **A05**/MF **A01**
Hawaii State Dept. of Planning and Economic Development, Honolulu .
Consumer Awareness in Solar Energy.
1978, 99p
Contract EW-78-G-49-0005

This workshop was held to provide consumers with basic technical, financial, and consumer protection information on residential solar water heaters. Nine appendices are given that relate to consumer protection. (ERA citation 05:009978)

DOE/TIC-11080 PC **A02**/MF **A01**
Argonne National Lab., IL.
Plastic Heat Exchangers for Waste Heat Recovery. ANL Activity No. 49907. Quarterly Report, October 1-December 31, 1979.
R. N. Koopman, and R. E. Holtz. 1979, 3p
Contract W-31-109-ENG-38

The program objective of Plastic Heat Exchangers for Waste Heat Recovery is to develop and apply technology for low-unit-cost plastic heat exchangers to conserve low-temperature waste heat and for other low-temperature applications. Accomplishments briefly described include coating of metal plates, composite plates, corrosion tests, and thermal performance and costs. (ERA citation 05:012125)

FEA/G-77/102 PC **A03**/MF **A01**
Los Alamos Scientific Lab., NM.
Use of Brackish Ground Water Resources for Regional Energy Center Development, Tularosa Basin, New Mexico: Preliminary Evaluation, Executive Summary.
Mar 77, 38p
Contract W-7405-ENG-36
Portions of document are illegible.

The objective of this study was to develop an impact and suitability profile for the use of the Tularosa Basin in south-central New Mexico as the potential location of an energy center. Underlying the Tularosa Basin is an aquifer system containing perhaps 40 million acre-feet of fresh and slightly saline (1-3 g/l) water that is theoretically recoverable and could be used for cooling and other energy-related or industrial purposes, particularly if energy development projects in other areas of the state and region are delayed, impeded, or cancelled because of uncertain availability or accessibility of water. This preliminary investigation of the Tularosa Basin reveals no outstanding features that would discourage further detailed analysis and planning for an energy complex. A major program of exploratory drilling, well logging, and testing is needed to determine aquifer characteristics and factors affecting well design. Since industrial development in the basin will necessarily involve Federal, state, and private lands, any serious plan will require collaboration of Federal, state, and local authorities. (ERA citation 05:010582)

INIS-mf-4499 PC **A02**/MF **A01**
World Energy Conference, Ottawa (Ontario). Canadian National Committee.
Proceedings of the Canadian National Energy Forum.
14p CONF-7704109-
Canadian national energy forum, Halifax, Canada, 4 Apr 1977.
U.S. Sales Only.

A separate abstract was prepared for each paper within the scope of the Energy Data Base. (Atomindex citation 09:409059)

INIS-mf-5086 PC **A06**/MF **A01**
Handelsministeriet, Copenhagen (Denmark).
Energy Political Review from the Ministry of Trade, ER79.
Mar 79, 101p
In Danish.
U.S. Sales Only.

According to Danish law the Trade Ministry should work out energy political reviews; this report is such a review. The report contains evaluations of energy needs and energy supply possibilities, goals, and plans in the energy area, including energy research and development programmes. The statement of objectives formulated in the report "Danish Energy Policy 1976" is reviewed, and an estimate is made regarding the implementation of the plan. (Atomindex citation 10:463788)

INIS-mf-5087 PC **A06**/MF **A01**
Handelsministeriet, Copenhagen (Denmark).
Evaluation of Security of Supplies for the Danish Energy System Up to 1995. Appendix to "Energy Political Review from the Ministry of Trade, ER79".
P. Skjerk Christensen, J. Daub, O. W. Dietrich, and P. Laut. Mar 79, 110p
In Danish.
U.S. Sales Only.

Security of energy supplies is one of the criteria which ought to be considered in future expansion of the Danish energy system. But security of supply is a difficult concept to quantity, involving as it does both technical and political aspects. This report attempts to identify the problems relating to security of supply, partly by (1) describing and evaluating the supply structure and the amount of the resources that could be thought of as entering into the future Danish pattern of energy supply, and (2) partly by analyzing the consequences for the Danish consumer of a disruption in the supply of a specific fuel. A supply disruption in the electric system is not treated in the report except insofar as the fuel entering into the electric system is covered in the study. 12 references. (Atomindex citation 10:463792)

INIS-mf-5088 PC **A03**/MF **A01**
Miljoeministeriet, Copenhagen (Denmark).

Energy and Environment. The Ministry of Environment's Developmental and Planning Work in Energy and Environment. Statement and Program.
Dec 78, 28p
In Danish.
U.S. Sales Only.

In the note from the Danish Ministry of Environment a presentation is given of the Ministry's projects concerning developmental and planning work in energy and environment. Furthermore the development and planning work in energy and environment is treated under the following headings: Noise from power plants; Use of coal in medium-large plants; Solar energy's entrance into building constructional planning; Coordination of town renewal and energy needs; Town planning, transportation needs, and energy use. (Atomindex citation 10:463377)

JACKFAU-78-159-2 PC **A08**/MF **A01**
Faucett (Jack) Associates, Inc., Chevy Chase, MD.
TEC Model: Transportation Energy Conservation Model. Final Report.
16 Aug 78, 167p

About one-third of all the energy consumed in the United States is burned by transportation vehicles, using 60% of all the petroleum that is consumed. The diversity and complexity of the total stock of transportation vehicles requires that meaningful analyses of conservation options must be based on sophisticated analytical capabilities. This report describes a computer-simulation model of transportation vehicles that provides such an analytical capability. Energy can be saved in transportation in several ways. Each trip that is taken could be made more efficient, which would generally lower the total number of trips taken. Trips that are of marginal usefulness can simply be eliminated. Finally, the fuel-consumption characteristics of the vehicles themselves can be altered to make them more efficient. The Transportation Energy Conservation Model provides a capability for analyzing the effects of altering the fuel efficiencies of the various transport vehicles, and allows some capability for analyzing the effects of changes in the level of use. (ERA citation 05:013763)

LA-8126-MS PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
Survey of Energy Projects and Instream Resources in the Upper Colorado and Upper Missouri River Basins.
D. Abbey, and C. Olinger. Nov 79, 24p
Contract W-7405-ENG-36

Western energy production is certain to affect fisheries, recreation, aesthetic values, and water quality. Specification of these effects requires analysis of individual stream reaches. This report directs energy-related assessments to the most valuable and critical stream reaches. Section I identifies reaches in the Rocky Mountain/Northern Great Plains Region with high quality instream resources and energy projects in the vicinity or upstream from those reaches. Part A of Section II reviews methodologies for assessing streamflow modifications; Part B reviews legal aspects of streamflow protection - state water law and federal environmental legislation. The final section draws limited conclusions concerning the impacts of and constraints on energy development. (ERA citation 05:012539)

LBL-9324(Rev.) PC **A02**/MF **A01**
California Univ., Berkeley. Lawrence Berkeley Lab.
Metal Foils for Direct Application of Absorber Coatings on Solar Collectors.
C. M. Lampert. Aug 79, 19p CONF-791021-1(Rev.)
Contract W-7405-ENG-48
American Electroplaters Society symposium on coatings for solar collectors, St Louis, MO, USA, 16 Oct 1979.

The basic materials and processing associated with the production of coated metal foils for solar collector absorber surfaces are discussed. Also covered are details of heavier metal strips for direct fabrication of solar collectors. Techniques including bonding methods and the use of adhesives are surveyed. Commercial solar foil manufacturers are covered, chiefly Berry Solar Products and Ergenics, along with the new research efforts in this area. In conclusion, advantages and disadvantages are outlined, with specific recommendations. (ERA citation 05:008372)

MTR-7972 PC **A04**/MF **A01**
MITRE Corp., McLean, VA. METREK Div.
Solar Information Outreach Monitoring and Action Plan Assessment System. Final Report.
R. Hewett. Dec 78, 71p
Contract EG-77-C-01-4041

A design concept with functional specifications is developed for a Solar Information Outreach Monitoring and Assessment System. System logic and functions are described, and methods are recommended for performing these functions. The objective of the system is to assist the DOE Division of Conservation and Solar Applications in monitoring market development, in keeping abreast with the evolving information needs of key participants within solar markets, and the activities of other agencies that conduct related programs, and in assessing the effectiveness of DOE's solar information outreach initiatives. (ERA citation 05:008232)

N78-76989/0 PC **A25**/MF **A01**
MITRE Corp., McLean, VA.
Proceedings of the Workshop on Wind Energy Conversion Systems (2nd) Held at Washington, DC. on June 9-11, 1975,
Frank R. Eldridge. Sep 75, 600p MTR-6970, NSF-RA-N-75-050
Grant NSF-AER75-12937
Sponsored in part by Energy Research and Development Administration, Washington, DC. Div. of Solar Energy. Prepared in cooperation with American Inst. of Aeronautics and Astronautics.Also includes N78-76990 through N78-77053.

Topic areas covered include: Design of large systems; International activities in wind energy; Technology development; Energy storage; Wind characteristics; Institutional issues; Agricultural and rural applications; Innovative and advanced system concepts.

N80-20813/5 PC **A03**/MF **A01**
Honeywell, Inc., Minneapolis, MN.
Qualification Test Procedures and Results for Honeywell Solar Collector Subsystem, Single-Family Residence.
Feb 77, 43p NASA-CR-161382
Contract NAS8-32093
Prepared for NASA and DOE.

The test procedures and results in qualifying the Honeywell single family residence solar collector subsystem are presented. Testing was done in the following areas: pressure, service loads, hail, solar degradation, pollutants, thermal degradation, and outgassing.

N80-20814/3 PC **A04**/MF **A01**
Moore School of Electrical Engineering. Philadelphia, PA.
Analysis and Evaluation in the Production Process and Equipment Area of the Low-Cost Solar Array Project.
Quarterly Report, May - Aug. 1979.
H. Goldman, and M. Wolf. Aug 79, 63p NASA-CR-162904, DOE/JPL-954796-79/7
Contract JPL-954796
Prepared for JPL and DOE.

The energy consumed in manufacturing silicon solar cell modules was calculated for the current process, as well as for 1982 and 1986 projected processes. In addition, energy payback times for the above three sequences are shown. The module manufacturing energy was partitioned two ways. In one way, the silicon reduction, silicon purification, sheet formation, cell fabrication, and encapsulation energies were found. In addition, the facility, equipment, processing material and direct material lost-in-process energies were appropriated in junction formation processes and full module manufacturing sequences. A brief methodology accounting for the energy of silicon wafers lost-in-processing during cell manufacturing is described.

ORAU/IEA-79-19(M) PC **A03**/MF **A01**
Oak Ridge Associated Universities, Inc., TN. Inst. for Energy Analysis.
Exogenous (Nonprice) Factors Influencing Energy/GNP Relationships in Leading OECD Countries.
E. L. Allen, and J. A. Edmonds. Dec 79, 49p
Contract EY-76-C-05-0033

This study addresses the effect of major trends other than prices on the energy demand and the energy/gross national product ratio (E/GNP) for six leading countries of the Organization for Economic Cooperation and Development (OECD) - Canada, France, Italy, Japan, the United Kingdom, and West Germany. Demographic, technological, political, and economic factors are analyzed in each country and then compared in a summary, integrated chapter. Demographic trends had the most important influence on energy demand. In each country studied, fertility rates have fallen markedly over the past two decades and now hover around 1.8, well below the population replacement level. This is expected to continue through the remainder of this century. The consequences of low fertility rates include: (1) an increase in the participation of women in the labor force; (2) an increase in the number of female automobile drivers; and (3) a decrease in projected total labor-force growth rates. In addition, the lower rate of household formation implicit in this declining population growth decreases residential energy use relative to GNP. Industry represents the largest energy-consuming sector. Industrial energy use is expected to continue a long-term downward trend relative to GNP, even in the absence of energy price increases. (ERA citation 05:012016)

ORAU/IEA-79-22(M) PC **A04**/MF **A01**
Oak Ridge Associated Universities, Inc., TN. Inst. for Energy Analysis.
Federal Republic of Germany: Estimates of Future Energy/GDP Relationships.
R. B. Williamson, and E. L. Allen. Dec 79, 64p
Contract EY-76-C-05-0033

Postwar trends in the West German economy, demography, and energy use were analyzed. The base year is 1976, and projections are made up to the year 2000 for gross domestic product (GDP) and sectoral energy demand. West Germany's 2.8% average annual GDP growth rate for the 1970s contrasts sharply with the 5.4% rate achieved in the 1960s. In part, this is due to a decline in the rate of capital formation from the level that prevailed in the 1960s. Also contributing to the drop in GDP growth has been a slower rate that reflects earlier retirements. Restrictions on immigration, imposed since 1975, mean that the slow domestic additions to the labor force will not be offset by migrants. The West German population decline is expected to persist as a consequence of the unusually low 1.5 to 1.6 total fertility rate. ORAU/IEA projects future GDP growth to level off at 2.9% a year, on the average, between now and 2000. This projection places German economic growth below that of Japan, Canada, and France but ahead of that projected for Italy and the United Kingdom. The relationship between West Germany energy demand and economic growth was stable in the postwar period. In 1976, total energy consumption stood at 9.8 quads and is projected to increase to 12.7 quads in 2000, an average annual 1.1 percent increase. The E/GDP ratio is expected to improve substantially by the year 2000, with the residential sector leading the way in energy efficiency. (ERA citation 05:012017)

ORAU/IEA-79-24(M) PC **A04**/MF **A01**
Oak Ridge Associated Universities, Inc., TN. Inst. for Energy Analysis.
Canada: Estimates of Future Energy/GNP Relationships.
E. L. Allen, J. A. Edmonds, and R. B. Williamson. Dec 79, 61p
Contract EY-76-C-05-0033

The Canadian economy has been expanding at an annual rate of 4.6% in the 1970s (GNP growth), second only to the remarkable record of Japan. Economic development has been bolstered by supportive government policies, a high rate of domestic savings, and a continuing inflow of investment capital. The average annual increase in nonresidential fixed investment has been 6.5%, which is higher than in any other major industrialized nation. As a consequence, productivity, or output

per worker, has not experienced the decline in growth which has been so striking in the US. In the future, Canadian economic development is expected to fall below past rates of achievement, primarily because of declining numbers of new entrants in the labor force. This trend will be only partially offset by higher female-participation rates. However, other factors affecting growth remain favorable. Canada, in particular, is virtually self-sufficient in energy. Government policy is to carry out a vigorous program of conservation, and to parallel this effort with domestic energy price increases which will move up to world levels over the next few years. As to economic growth, GNP expansion is expected to remain well above 3 percent a year for the balance of this century. Energy consumption is expected to grow from 7.51 Btu x 10 exp 15 (quads) in 1976 to 13.3 quads by 2000. This means that energy growth, as a consequence of determined conservation, is expected to be about half as rapid as economic growth to 1990. (ERA citation 05:012018)

ORAU/IEA-79-25(M) PC **A06**/MF **A01**
Oak Ridge Associated Universities, Inc., TN. Inst. for Energy Analysis.
United Kingdom: Estimates of Future Energy/GDP Relationships.
J. C. Gehman, and E. L. Allen. Dec 79, 106p
Contract EY-76-C-05-0033

The UK economy is expected to grow in real terms, due for the most part to advances in productivity. An increase in the labor-force-participation rate as a result of more women entering the labor force - to about 65% - should just offset a decline in the workweek. The latter is a result of a preferential shift to more leisure time and will reach 33 hours. With productivity increasing, but at a declining rate, real GDP is projected at 50% above the 1976 level. Turning to a sectoral analysis, the number of households is expected to increase by 15% as more individuals choose to live alone. The historical shift from goods production to services is expected to continue, but at a slower pace; by the year 2000 service output is expected to reach 55% of GDP. In the transport sector, the historical shift toward the passenger car is expected to saturate at about 70% of total ton-miles, while the shift toward struck freight is expected to continue and reach 76% of total ton-miles. Goods production is expected to stagnate and could fall to 33% of GDP by 2000. Historically, E/GDP has fallen steadily in the United Kingdom due almost exclusively to industrial conservation (investment in new and more-efficient plant and equipment). Conservation should spread to all other sectors of the economy as a result of government policy. The E/GDP ratio is expected to fall by another 28% by the year 2000. This implies total energy consumption of 8.7 quads. (ERA citation 05:012019)

ORNL/TM-6951 PC **A13**/MF **A01**
Oak Ridge National Lab., TN.
Energy Availabilities for State and Local Development: 1975 Data Volume.
J. B. Mills, P. L. Rice, and D. P. Vogt. Jan 80, 285p
Contract W-7405-ENG-26

The supply, demand, and net imports of seven fuel types of four final consuming sectors for Bureau of Economic Analysis Areas (BEAs), states, census regions, and the nation in 1975 are presented. The data are formatted to present regional energy availability from primary extraction as well as from regional transformation processes. Extensive tables depict energy balances between availability and use for each specific fuel. In keeping with the Metric Conversion Act of 1975, this volume is reported in joules rather than in Btu's. The objective of this series is to provide a consistent base of historic and projected energy information within a standard format. Such a framework should aid regional policymakers in their consideration of regional-growth issues that may be influenced by the regional energy system. For analysis of specific regions, however, this basic data should be supplemented by additional information which only the local policy analyst can bring to bear in his assessment of the energy conditions that characterize his region. (ERA citation 05:013684)

ORNL/TM-7171 PC **A04**/MF **A01**
Oak Ridge National Lab., TN.
Fossil Energy Program. Progress Report for November 1979.
Jan 80, 74p
Contract W-7405-ENG-26

This report - the sixty-fourth of a series - is a compendium of monthly progress reports for the ORNL research and development programs that are in support of the increased utilization of coal and other fossil fuel alternatives to oil and gas as sources of clean energy. The projects reported this month include those for coal conversion development, materials engineering, a coal equipment test program, an atmospheric fluid bed combustor for cogeneration, engineering studies and technical support, process and program analysis, environmental assessment studies, magnetic beneficiation of dry pulverized coal, technical support to the TVA fluid bed combustion program, coal cogeneration/district heating plant assessment, chemical research and development, and technical support to major liquefaction projects. (ERA citation 05:011034)

ORO-5135-77/5 PC **A11**/MF **A01**
West Virginia Univ., Morgantown. Dept. of Aerospace Engineering.
Vertical Axis Wind Turbine Development. Final Report, March 1, 1976-June 30, 1977.
R. E. Walters, J. B. Fanucci, P. W. Hill, and P. G. Migliore. Jul 79, 243p
Contract EY-76-C-05-5135

Theoretical and experimental research accomplished in evaluating an innovative concept for vertical axis wind turbines (VAWT) is described. The concept is that of using straight blades composed of circulation controlled airfoil sections. The theoretical analysis has been developed to determine the unsteady lift and moment characteristics of multiple-blade cross-flow wind turbines. To determine the drag data needed as input to the theoretical analysis, an outdoor test model VAWT has been constructed; design details, instrumentation, calibration results, and initial test results are reported. Initial testing was with fixed pitch blades having cross-sections of conventional symmetrical airfoils. Costs of building the test model are included, as well as cost estimates for blades constructed with composite materials. These costs are compared with those of other types of wind turbines. (ERA citation 05:011827)

PATENT-4 192 290 Not available NTIS
National Aeronautics and Space Administration. Langley Research Center, Langley Station, VA.
Combined Solar Collector and Energy Storage System.
Patent,
R. N. Jensen. Filed 28 Apr 78, patented 11 Mar 80, 6p N80-20810/1, PAT-APPL-900 843 NASA-CASE-LAR-12205-1
Supersedes PAT-APPL-900 843-78, N78-23567 (16 - 14, p 1868).
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC. 20231 $0.50.

A combined solar energy collector, fluid chiller and energy storage system is disclosed. A movable interior insulated panel in a storage tank is positionable flush against the storage tank wall to insulate the tank for energy storage. The movable interior insulated panel is alternately positionable to form a solar collector or fluid chiller through which the fluid flows by natural circulation.

PB80-168321 PC **E03**/MF **E03**
International Inst. for Applied Systems Analysis, Laxenburg (Austria).
Evaluation of Energy Processes through Entropy and Exergy.
Final rept.,
Hans Voigt. c1978, 27p RM-78-60

The measure of effectiveness with which energy is transformed or used in processes requires consideration of properties other than energy alone. Entropy is the most important quantity in this context. It permits to localize sources of ineffectiveness and calculate thermodynamic upper limits of efficiencies. Energy is closely related to entropy and can be used for similar purposes; it also has the same dimension and order of magnitude as energy, but is not a variable of state in a thermodynamic sense. In this memorandum, the formalism is introduced and discussed for a coal-fired electric power plant, methanol production, and negentropy technologies. It is proposed to favor entropy production or energy consumption over the concept of wasted or consumed energy as a measure of the effectiveness of energy use or conversion. (Copyright (c) 1978 IIASA.)

PNL-RAP-36(V.3) PC **A05**/MF **A01**
Battelle Human Affairs Research Centers, Seattle, WA.
Regional Issue Identification and Assessment (RIIA). Volume III. Institutional Barriers to Developing Power Generation Facilities in the Pacific Northwest.
F. A. Morris, C. H. Sawyer, and J. H. Maxwell. Oct 79, 99p
Contract EY-76-C-06-1830

The Regional Assessments Division in the US Department of Energy (DOE) has undertaken a program to assess the probable consequences of various national energy policies in regions of the United States and to evaluate the constraints on national energy policy imposed by conditions in these regions. The program is referred to as the Regional Issues Identification and Assessment (RIIA) Program. Currently the RIIA Program is evaluating the Trendlong Mid-Mid scenario, a pattern of energy development for 1985 and 1990 derived from the Project Independence Evaluation System (PIES) model. This scenario assumes a medium annual growth rate in both the national demand for and national supply of energy. It has been disaggregated to specify the generating capacity to be supplied by each energy source in each state. Pacific Northwest Laboratory (PNL) has the responsibility for evaluating the scenario for the Federal Region 10, consisting of Alaska, Idaho, Oregon, and Washington. PNL is identifying impacts and constraints associated with realizing the scenario in a variety of categories, including air and water quality impacts, health and safety effects, and socioeconomic impacts. This report summarizes the analysis of one such category: institutional constraints - defined to include legal, organizational, and political barriers to the achievement of the scenario in the Northwest. (ERA citation 05:011996)

PNL-SA-7200 PC **A03**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Heliostat Glass Survey and Evaluation.
M. A. Lind, and J. M. Russin. 1978, 32p
Contract EY-76-C-06-1830

The glass characterization and specification task included a comprehensive survey of both foreign and domestic sources of low distortion, low iron, .125 nominal flat glass for use in heliostat applications. PNL attempted to determine the availability of production lines, estimate industry interest, lead times, and costs for producing glass for second surface heliostat mirrors for the Barstow pilot plant and future commercial plants. Glass samples representative of the industry production capability were collected and characterized. The results of the survey and analysis were used to generate a specification for the Barstow Pilot Plant glass procurement. (ERA citation 05:011634)

PNL-SA-7270 PC **A02**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Wind Characteristics for Agricultural Wind Energy Applications.
D. S. Renne. Jan 79, 5p CONF-7904120-1
Contract EY-76-C-06-1830
14. conference on agriculture and forest meteorology, Minneapolis, MN, USA, 2 Apr 1979.

Wind energy utilization in agriculture can provide a potentially significant savings in fuel oil consumption and ultimately a cost savings to the farmer. A knowledge of the wind characteristics within a region and at a location can contribute greatly to a more efficient and cost-effective use of this resource. Current research indicates that the important wind characteristics include mean annual wind speed and the frequency distribution of the wind, seasonal and diurnal variations in wind speed and direction, and the turbulent and gustiness characteristics of the wind. Further research is underway to provide a better definition of the total wind re-

source available, improved methods for siting WECS and an improved understanding of the environment to which the WECS respond. (ERA citation 05:011820)

PNL-SA-7637 PC **A03**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Weathering and Leaching of Glass for Solar Heliostats.
J. M. Rusin. Mar 79, 27p
Contract EY-76-C-06-1830

In order to assess the effects of weathering on the transmittance of glass, several old samples were collected from two desert environments for evaluation. The glass obtained by PNL at the Hanford reservation in Washington came from south-facing, vertical windows which were known to be over forty years old. The glass obtained by Sandia from Barstow, California, is estimated to be over twenty years old. To determine the durability of glasses proposed for heliostat mirrors, selected samples were leached in a Soxhlet apparatus and pH 4 and pH 9 buffer solutions. The glass samples produced by the float process are soda-lime-silica glasses, whereas the glass samples produced by the fusion process are aluminosilicate glasses. Results are presented and discussed. (ERA citation 05:011635)

PNL-SA-7698 PC **A02**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Solar Reflector Materials.
M. A. Lind. 1979, 23p CONF-7905134-1
Contract EY-76-C-06-1830
WSPE seminar on high-level solar energy, Seattle, WA, USA, 18 May 1979.

A brief overview is given of the current state-of-the-art in solar reflector material:. Its purpose is to outline the uses of reflectors in the solar industry and present some insights into the operational and materials considerations that must be incorporated into the solar reflector design. Current problem areas and research goals will be emphasized. (ERA citation 05:011692)

PNL-2850(Pt.4) PC **A06**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Pacific Northwest Laboratory Annual Report for 1978 to the DOE Assistant Secretary for Environment. Part 4. Physical Sciences.
J. M. Nielsen. Feb 79, 121p
Contract EY-76-C-06-1830

Separate abstracts were prepared for each of the five sections of this report as follows: coal; fission; geothermal; oil shale; and multitechnology. In addition, abstracts were prepared for six of the nine individual subsections of the section on fission, that relate to dosimetric studies. (ERA citation 05:013042)

SAN-1095-T2 PC **A04**/MF **A01**
AiResearch Mfg. of Arizona, Phoenix.
Study on Reduction of Automotive Accessory Power Requirements: Final Executive Summary. Final Report, June 1974-June 1978.
20 Oct 78, 62p
Contract EY-76-C-03-1095

This program was directed toward near-term automotive accessory optimization and toward evaluation of accessory systems for advanced Stirling and turbine automotive and truck propulsion engines. The objective was to define, evaluate and develop automotive accessory systems to minimize engine power consumption and significantly improve fuel economy. The program phases included: the conceptual, preliminary and detail design of automotive accessory systems and accessory drives; fabrication, assembly and laboratory testing of such systems and drives; vehicle/driving cycle energy source evaluation for accessory power augmentation, hybrid drive concept study, and an automotive air conditioning concept study for maximum required performance and minimum fuel consumption; and definition of automotive Stirling and gas turbine accessory requirements. Data from these studies are presented. It is concluded that equipping the 1979 US intermediate vehicle population with accessory speed control devices would conserve 69,000 bbl/d of fuel. If modified to take full advantage of energy reclamation and advanced accessory designs, the fuel savings could be as high as 150,000 bbl/d. If the entire US automotive population, with full accessory arrays, were equipped with accessory speed control devices, fuel conservation in the range of 180,000 to 400,000 bbl/d would be possible. The advanced accessory system technology discussed herein should be applied concurrently with new engine development to produce effective and efficient systems that maximize fuel economy potential. (ERA citation 05:013784)

SAN-1109-79-2 PC **A08**/MF **A01**
Honeywell, Inc., St. Petersburg, FL. Avionics Div.
Wind Tunnel Test of 1/30 Scale Heliostat Field Array Model. Test Report.
G. L. Brown. 22 Feb 78, 168p
Contract EY-76-C-03-1109

From 9 January through 20 January 1978, Honeywell conducted a wind tunnel test on a 1/30 scale partial heliostat field. The heliostats were per Honeywell's design developed under the 10 megawatt central receiver pilot electrical power plant subsystem research experiment contract. Likewise, the scaled section of the field geometry duplicated the proposed circular layout. Testing was conducted at the Georgia Institute of Technology's 9 foot subsonic tunnel. The objective of the test was to ascertain from a qualitative standpoint the field effects upon wind loading within a heliostat field. To accomplish this, numerous pressure tap measurements at different heights and at different field positions were taken with varying wind speeds, fence designs, and heliostat gimbal orientations. The Department of Energy specified boundary layer profile was also scaled by 1/30 in order to simulate the total wind effects as accurately as possible taking into account the potentially severe scaling or Reynolds number effects at a 1/30 scale. After initial model set-up within the tunnel and scaled boundary layer generated, 91 separate runs were accomplished. The results do demonstrate the high sensitivity of wind loading upon the collector field due to the actual heliostat orientation and fence geometry. Vertical pressure gradients within the model field and flow reentry angles provide a good qualitative feel as to the full scale environment that might be expected and point to the need for specific additional testing to further explore potentially dangerous conditions. (ERA citation 05:013326)

SAN-1468-1 PC **A17**/MF **A01**
General Electric Co., Schenectady, NY. Energy Systems Programs Dept.
Solar Central Receiver Prototype Heliostat: Phase 1. Final Technical Report, September 30, 1977-June 24, 1978.
Oct 78, 385p
Contract EG-77-C-03-1468

The complete preliminary design analysis and drawings of the heliostat system that were used as the basis for the manufacturing conceptual design and cost estimates are presented. Complete costing data is included along with all of the assumptions and data used in studying the production processes. A detailed description of the control system design is given together with a full report on the breadboard testing of the linear motor drives and the self-calibrating control system. Specifications and a conceptual design of the Automatic Foundation Machine are provided as well as a complete description of the installation process and its labor and time estimates. The enclosed heliostat consists of an aluminized film reflector which is deployed on a lightweight, eight-strut frame mounted on a single pipe pedestal with azimuth and elevation drives and totally housed in an air supported enclosure. An open loop control system with self calibration capability directs centrally computed sun angles and steering commands to individual heliostats of a total system via 2-way multiplex methods over the field power distribution network. Totally mass-produced in conventional industrial factories, the preassembled components are shipped without restriction and are semi-automatically installed within 30-minute time cycles. Requiring no cleaning, the 30-year life cycle maintenance costs include two complete enclosure and reflector replacements. (ERA citation 05:013327)

SAN-1731-T2 PC **A12**/MF **A01**
Varigas Research, Inc., Timonium, MD.
Comparative Study of the Energy Characteristics of Powered Hand Tools. Part II. Investigation Reports. Final Report.
1979, 253p
Contract EY-77-C-03-1731

Results are presented of a theoretical analysis and a field test program to determine the relative energy efficiencies of different types of powered hand tools. First analyzed and then tested were grinders, drills and nutrunners powered by hydraulic fluid, compressed air 60 Hz single phase electricity, three phase 180 Hz electricity, three phase 360 Hz electricity and, in the case of flexible shaft tools, three phase 60 Hz power. The work included the determination of the energy use of the total system including air compressors and frequency converters where appropriate. Distribution system losses also were considered. The result of the work is that the pneumatic tools, which have become the most popular tools in industry, use between five and fifteen times more energy than the various electrically powered tools, to do the same work. Part I of the report is intended to provide an overview of the activity and a summary of the results. Part II, Investigation Reports, is the detailed exposition of the work and results. A related report, entitled Multifrequency Factory Operations, examines the potential energy savings which accrue when higher frequency electric power is used for lighting as well as tooling. (ERA citation 05:012120)

SAND-79-1802 PC **A02**/MF **A01**
Sandia Labs., Albuquerque, NM.
Heat Transfer Fluid Experiences at the MSSTF.
W. H. McCulloch. Jan 80, 21p
Contract EY-76-C-04-0789

Samples of the heat transfer fluid (mixture of Therminol 66 and Caloria HT43) have been taken periodically from the DOE/Sandia Midtemperature Solar Systems Test Facility for the purpose of determining whether there is any long-term degradation as evidenced by changes in fluid thermophysical properties. This report compares the results from three different investigators and concludes that there has been no significant change attributable to thermal degradation after almost four years since first operation. (ERA citation 05:013385)

SAND-79-2110 PC **A03**/MF **A01**
Sandia Labs., Albuquerque, NM.
Selected Residential Electric Rates and Rate Structures in the US.
D. L. Caskey. Jan 80, 37p
Contract EY-76-C-04-0789

Residential electric rate structures, including fuel adjustments and other charges, for 16 US cities were surveyed in July, 1979. Total bills for usages of 1000 kWh and 2000 kWh per month were determined. The average rate of increase in rates over the past three years was found to be 15% per year, compared to the general inflation rate of just over 7% per year for the same period. Present and proposed utility rates for time-of-day pricing and buyback are included. (ERA citation 05:012095)

SERI/RR-351-347 PC **A03**/MF **A01**
Solar Energy Research Inst., Golden, CO.
Simple Design Tool for Sizing Solar Ponds.
M. Edesess, J. Henderson, and T. S. Jayadev.
Dec 79, 42p
Contract EG-77-C-01-4042

This report presents a simple tool and method of analysis to aid practitioners in the planning and implementation of solar energy systems. This simple design tool for sizing solar ponds should aid analysts and planners in assessing the feasibility of solar ponds for any specified application, and in drawing up a preliminary plan for their implementation. (ERA citation 05:011706)

SERI/TR-334-244 PC **A04**/MF **A01**
Solar Energy Research Inst., Golden, CO.
Basic and Applied Research Program. Semiannual Report, July-December 1978.
B. L. Butler. Dec 79, 57p
Contract EG-77-C-01-4042

The status of research projects in the Basic and Applied Research Program at SERI is presented for the semiannual period ending December 31,

1978. The five tasks in this program are grouped into Materials Research and Development, Materials Processing and Development, Photoconversion Research, Exploratory Research, and Energy Resource and Assessment and have been carried out by personnel in the Materials, Bio/Chemical Conversion, and Energy Resource and Assessment Branches. Subtask elements in the task areas include coatings and films, polymers, metallurgy and corrosion, optical materials, surfaces and interfaces in materials research and development; photochemistry, photoelectrochemistry, and photobiology in photoconversion; thin glass mirror development, silver degradation of mirrors, hail resistance of thin glass, thin glass manufacturing, cellular glass development, and sorption by desiccants in materials processing and development; and thermoelectric energy conversion, desiccant cooling, photothermal degradation, and amorphous materials in exploratory research. For each task or subtask element, the overview, scope, goals, approach, apparatus and equipment, and supporting subcontracts are presented, as applicable, in addition to the status of the projects in each task or subtask. Listing of publications and reports authored by personnel associated with the Basic and Applied Research Program and prepared or published during 1978 are also included. (ERA citation 05:009995)

SERI/TR-354-365 PC **A03**/MF **A01**
Solar Energy Research Inst., Golden, CO.
Product Liability and Small Wind Energy Conversion Systems (SWECS): An Analysis of Selected Issues and Policy Alternatives.
R. J. Noun. Dec 79, 49p
Contract EG-77-C-01-4042

An overview is presented of the various legal issues regarding SWECS performance and safety, according to when such issues may arise during the SWECS manufacturing and marketing processes. Next, the most significant issues are translated into a series of questions, followed by a legal analysis that addresses these questions within the framework of the present product litigation system. The special problems presented to SWECS by judicial treatment of design defect cases and the relevance of industry standards in product cases are emphasized. Finally, a number of policy alternatives for DOE and others to consider are examined concerning their relative advantages and disadvantages in dealing with selected issues. (ERA citation 05:011815)

UT/CES-PS-7 PC **A09**/MF **A01**
Texas Univ. at Austin. Center for Energy Studies.
Impact of Mexican Oil on the World Oil Market.
J. D. Creasey, and V. C. Langston. Oct 79, 188p

The impact of Mexico's new role as a major supplier of petroleum resources on OPEC and the world energy markets over the next 20 years are discussed. A review of six alternative world supply/demand forecasts is presented. Revenue projections for each member of OPEC are included. A modified Kennedy World Oil Model is used to analyze the changes that will result from Mexican entry into the world oil market. Policy implications for the 3 major participants in the market (the Persian Gulf, Mexico, and the United States) are analyzed. Also discussed is the stated intention of certain Persian Gulf suppliers to limit capacity expansion. The question of whether a barrel of oil is worth more in the ground than it is in today's market in regard to Mexican policy is discussed. Backstop research and development and conservation of oil usage in the USA are also covered. (ERA citation 05:011229)

UT/CES-PS-8 PC **A04**/MF **A01**
Texas Univ. at Austin. Center for Energy Studies.
Yugoslavia's Energy Supplies: Constraints and Outlook.
G. W. Hoffman. Nov 79, 68p

This report describes Yugoslavia's changing energy-supply situation, emphasizing the current use pattern of its resources, its production, and the problems created by the country's structural and regional imbalances. The report considers the impact of an ever-increasing dependence on foreign imports. The study analyzes the impact of the under-fulfilled goals of the 1976-1980 Plan on the establishment of a viable long-term energy policy for the country and suggests some essential solutions to the country's energy problems. (ERA citation 05:012029)

10B. Power Sources

AD-A082 766/7 PC **A03**/MF **A01**
Naval Air Engineering Center Lakehurst NJ Ground Support Equipment Dept
Electric Power Quality Test Set.
Final rept. Jul 75-Sep 79,
Stephen M. Reustle. 11 Mar 80, 40p Rept no. NAEC-92-141

An analysis of the practicality and cost-effectiveness of a portable test set to determine compliance of an electric power system to MIL-STD-704C is undertaken. This is part of an overall effort to develop a new DOD Mobile Electric Power Plant (MEP-354). One of main objectives of this program is to develop an electric power system capable of meeting the specifications of MIL-STD-704C. (Author)

AED-Conf-77-561-004 PC **A02**/MF **A01**
Zentralstelle fuer Atomkernenergie-Dokumentation (ZAED), Eggenstein-Leopoldshafen (Germany, F.R.).
Construction and Plume Observation on a Dry/Wet Test Cell in the Marbach III Power Plant.
R. Beising. 1977, 9p CONF-771262-3
In German.Technical meeting on cooling tower operation, Duesseldorf, F.R. Germany, 2 Dec 1977. U.S. Sales Only.

Using a wet/dry prototype cooling tower in addition to the existing wet cooling tower cells, the possibility was given in Marbach to study this new cooling technique which had not been tested before in the Federal Republic. It was found that combined cooling with plastic heat exchangers is a promising way to shorten the plumes, although in varying degrees, and to save water due to lower evaporation losses. It should be noted, however, that the plume behaviour observed cannot be used to draw conclusions on high-power dry/wet cooling towers, e.g. for a 1300 MW power plant unit. (Atomindex citation 09:395691)

AED-Conf-78-155-030 PC **A02**/MF **A01**
Zentralstelle fuer Atomkernenergie-Dokumentation, Eggenstein-Leopoldshafen (Germany, F.R.).
For the Whole Power Plant a BBC Control System.
G. Koelsch. 1978, 11p CONF-7804102-21
In German.Systems exhibition energy within the context of the Hannover fair, Hannover, F.R. Germany, 19 Apr 1978.
U.S. Sales Only.

The boiler control system Decontrol K, which is a part of the BBC control system PROCONTROL K is described. The system is easy to handle and is easily serviced, and the effects in case a unit fails are very small. (Atomindex citation 09:405104)

ALO-15362-1 PC **A06**/MF **A01**
Westinghouse Research and Development Center, Pittsburgh, PA.
Collector Sealants and Breathing. Mid-Term Report, September 25, 1978-May 30, 1979.
M. A. Mendelsohn, F. A. Yeoman, R. M. Luck, F. W. Navish, Jr., and J. F. Meier. 1978, 102p
Contract AC04-78CS15362

The objectives of this program are: (1) to investigate the pertinent properties of a variety of possible sealants for solar collectors and identify the most promising candidates and to study the effect of breathing in flat-plate, thermal solar collector units. The study involves two types of sealants, Class PS which includes performed seals or gaskets and Class SC which includes sealing compounds or caulks. It is the intent of the study to obtain data regarding initial properties of candidate elastomers from manufacturers and from the technical literature and to use those sources to provide data pertaining to endurance of these materials under environmental service conditions. Where necessary, these data are being augmented by experimental measurements. Environmental stresses to be evaluated by these measuremets include elevated temperatures, moisture, ultraviolet light, ozone and oxygen, and fungus. The second major area of the work involves a study of the effects of materials used and design on the durability of solar collectors. Factors such as design, fabrication, materials of construction, seals and sealing techniques and absorber plate coatings were observed on actual field units removed from service. Such phenomena as leakage, corrosion and formation of deposits on glazing and absorber plate were noted. An evaluation of the properties of several desiccants is being made in order to provide means to mitigate the deleterious effects of water on collector life.Absorbents for organic degradation products of sealants are also being investigated in order to protect the glazing and absorber plate from deposited coatings. Since adsorbents and desiccants in general tend to take up both waer and organic decomposition products, relative affinities of a number of these agents for water and for organic compounds are being determined. (ERA citation 05:011686)

ALO-4261-T8 PC **A08**/MF **A01**
Science Applications, Inc., McLean, VA.
Assessment of the Technology Transfer Potential of Federal Photovoltaic Power System Applications to Commercial Markets. Final Report.
T. F. Jaras. Jun 79, 153p
Contract EM-78-C-04-4261

An assessment of the market potential of photovoltaic power supplies is presented. Markets analyzed include the water pumping market, marine navigational aids, cathodic protection, remote general power sources, telecommunications, air navigational aids, mobile generator market, instrumentation, and utility connected applications. (ERA citation 05:011590)

ATR-79(7780)-1 PC **A04**/MF **A01**
Aerospace Corp., Los Angeles, CA. Energy and Resources Div.
Solar Thermal Small Power Systems Study. Inventory of US Industrial Small Electric Power Generating Systems.
1 Jun 79, 59p
Contract ET-78-C-03-2226

This inventory of small industrial electric generating systems was assembled by The Aerospace Corporation to provide a data base for analyses being conducted to estimate the potential for displacement of these fossil-fueled systems by solar thermal electric systems no larger than 10 MW in rated capacity. The approximately 2100 megawatts generating capacity of systems in this category constitutes a potential market for small solar thermal and other solar electric power systems. The sources of data for this inventory were the (former) Federal Power Commission (FPC) Form 4 Industrial Ledger and Form 12-C Ledger for 1976. Table 1 alphabetically lists generating systems located at industrial plants and at Federal government installations in each of the 50 states. These systems are differentiated by type of power plant: steam turbine, diesel generator, or gas turbine. Each listing is designated as a power system rather than a power unit because the FPC Ledgers do not provide a means of determining whether more than one unit is associated with each industrial installation. Hence, the user should consider each listing to be a system capacity rating wherein the system may consist of one or more generating units with less than 10 MW/sub e/ combined rating. (ERA citation 05:011630)

CONF-7809197- PC **A06**/MF **A01**
Argonne National Lab., IL.
Proceedings of the Workshop on Stratospheric and Mesospheric Impacts of Satellite Power Systems (SPS).
Dec 79, 120p
Contract W-31-109-ENG-38
Workshop on stratospheric and mesipheric impacts of satellite power systems, Rosemont, IL, USA, 6 Sep 1978.

Three general issues were identified as potentially significant and deserving of consideration. These general issues are summarized as follows: (1) Composition perturbations due to: (a) rocket exhaust emissions, and (b) reentry effects; (2) Climatic effects due to: (a) increased noctilucent cloud formation, and (b) composition perturbations; and (3) Effects of localized energy injection:

(a) rocket exhaust thermal energy and (b) microwave absorption. The conclusions and recommendations of the workshop participants are summarized for each individual issue. The basis for these conclusions is contained in the participants' discussion as summarized in the preceding section and in the written contributions prepared by individual participants and collected together in Appendix B. The recommendations for further research also in general follow from the discussion, but are also based upon the assumption that two years would be available from the date of the workshop in which to carry them out before the final environmental impact assessment would be due. Finally, a list of general recommendations made by workshop participants is given. (ERA citation 05:013240)

CONF-790640-7 PC **A02**/MF **A01**
Argonne National Lab., IL.
Open-Cycle Coal-Fired Liquid-Metal MHD.
E. S. Pierson, M. Petrick, F. Schreiner, and D. Cohen. 1979, 12p
Contract W-31-109-ENG-38
18. symposium on engineering aspects of magnetohydrodynamics, Butte, MT, USA, 18 Jun 1979.

Open-cycle, coal-fired, liquid-metal MHD combines the simplicity of using the coal combustion products directly as the thermodynamic working fluid in the energy-conversion process with the moderate temperatures and inherent high thermodynamic efficiency of the two-phase liquid-metal MHD cycle. This new concept is described and compared with the open-cycle plasma MHD cycle, and it is shown that, in the former, temperatures are much lower and the air preheater and radiant boiler are eliminated. The constraints on the electrodynamic working fluid and the choice of copper are discussed. Recent experiments with liquid copper and coal combustion gas are described, and the indicated implications for environmental impact, i.e., SO/sub x/ and NO/sub x/ control, are discussed. Initial efficiency calculations yield values comparable to those for open-cycle plasma MHD at combustor temperatures as much as 1000 K lower and MHD generator temperatures more than 1000 K lower than is the case for open-cycle plasma MHD. Significantly, the liquid-metal MHD system uses components that, except for the generator, are close to or within present-day technology, and it appears that readily-available containment materials are compatible with the fluids. (ERA citation 05:012056)

CONF-791204-11 PC **A02**/MF **A01**
Argonne National Lab., IL.
Assessment of High-Head Turbomachinery for Underground Pumped Hydroelectric Storage Plants.
S. W. Tam, A. A. Frigo, and C. A. Blomquist. 1979, 18p
Contract W-31-109-ENG-38
Miami international conference on alternative energy sources, Miami Beach, FL, USA, 10 Dec 1979.

Underground Pumped Hydroelectric Storage (UPHS) plant costs for plants equipped with advanced reversible pumped turbines have been considered. Equipment used includes single- and two-stage reversible pump turbines for operating heads from 500 to 1500 m. The effects of machinery costs, operating heads, plant configurations and sizes have been taken into account. The results indicate that the use of advanced machinery seems to push the minimum UPHS plant cost to heads greater than 1500 m. The employment of advanced, reversible pump turbines seems to be economically attractive. It is shown that pump-turbine efficiencies and the so-called charge/discharge ratio are very important design parameters for UPHS applications and the interactive effects of these parameters have been analyzed. The results show that under certain conditions a pump-turbine option with a higher charge/discharge ratio at the expense of somewhat lower operating efficiency can be desirable. Careful integration of pump-turbine performance characteristics with the overall system consideration (i.e., UPHS plant design and utility grid requirement) bears significantly on the direct cost savings due to the differing capital costs of the various machines. More importantly, such considerations have a significant impact on the storage cost, the most important element in UPHS plant cost considerations. (ERA citation 05:011962)

CONS-2895-3 PC **A08**/MF **A01**
Arnold Engineering Development Center, AFS, TN.
Report on the MHD Performance Demonstration Experiment, October 1, 1977-September 30, 1978.
H. J. Schmidt, R. F. Starr, J. T. Lineberry, G. L. Whitehead, and B. L. Seiber. Apr 79, 155p
Contract ET-78-I-01-2895

The Arnold Engineering Development Center (ALDC) has been under contract since December 1973 to modify existing equipment and to design, fabricate, and install new hardware to perform an MHD Performance Demonstration Experiment. The objective of the experiment is to demonstrate that a generator simulating a commercial-sized device can convert 16 to 18 percent of the available thermal energy into electrical power. This report described fabrication, installation, and testing of hardware for this experiment during the period from October 1, 1977, to September 30, 1978. In the past year, fabrication of the high performance generator channel was completed, and satisfactorily pressure and electrically checked. The coils and approximately 95 percent of the coil force containment structure were installed on the 6 Tesla magnet. Fabrication of the outer insulation panels for the magnet was completed. The magnet is to be cryogenically cooled with liquid nitrogen. During the past year, analytical studies to provide guidance in performing the cooldown were completed and are presented. The preliminary design of the cooling manifold system to provide the required control in accordance with the results of the analytical studies was also completed and is reported. Additional testing of the burner system with the diagnostic section installed was conducted and the results for seeded and unseeded operation are included. (ERA citation 05:012057)

COO-2263-15 PC **A05**/MF **A01**
Rasor Associates, Inc., Sunnyvale, CA.
Advanced Thermionic Energy Conversion. Joint Highlights and Status Report, April-June 1979.
1979, 81p NSR-2-15
Contract EY-76-C-02-2263

The DOE portion of the effort at Rasor Associates is directed primarily toward terrestrial applications of thermionic energy conversion. It focuses on the development of converters suitable for use with fossil fueled heat sources in power plants. The NASA program is directed at establishing the technical feasibility of an advanced light-weight long-life thermionic conversion system compatible with a remote nuclear or solar heat source. The principal application forseen at this time is in nuclear electric propulsion (NEP) missions in the mid-1990's. Significant accomplishments for the three month period include: (1) devised a blade-type distributed lead design with many advantages compared to the stud-type distributed lead; (2) completed design of Marchuk tube test apparatus; (3) concluded, based on current understanding, that residual hydrogen should not contribute to a negative space charge barrier at the collector; (4) modified THX design program to include series-coupled designs as well as inductively-coupled designs; (5) initiated work on the heat transfer technology, THX test module, output power transfer system, heat transfer system, and conceptual plant design tasks; and (6) reached 2200 hours of operation in JPL-5 cylindrical converter envelope test. (ERA citation 05:012065)

COO-2381-1(3-79) PC **A08**/MF **A01**
Johns Hopkins Univ., Laurel, MD. Applied Physics Lab.
Overview of the Chalk Point Cooling Tower Project, 1972-1979.
M. L. Moon. Mar 79, 172p
Contract EY-76-C-02-2381

The objectives, methodologies, data, and analytical results of the Chalk Point Cooling Tower Program are reviewed. The overview intergrates the concepts and activities of the various program elements to provide a coherent view of the program in its entirety. Samples of the various data acquired are included together with very brief summaries of the conclusions. The report is extensively referenced to provide specific directions to the more extensive treatments of the program, data tabulations, and tape libraries available in the complete library of Chalk Point reports. The Chalk Point data is a resource for the study of cooling tower salt deposition processes and impacts in general. The methods used, while developed to facilitate the assessment of salt drift impact at Chalk Point, also have applicability to cooling tower impact analysis at other sites. (ERA citation 05:013501)

COO-3056-36 PC **A05**/MF **A01**
Thermo Electron Corp., Waltham, MA.
DOE/JPL Advanced Thermionic Technology Program. Progress Report No. 36, October-November 1978. Report No. TE4258/4247-89-79.
1978, 82p
Contract EY-76-C-02-3056

Progress is reported on DOE tasks including: (1) thermionic converter plasma studies; (2) low temperature converter development; (3) component hardware development; and (4) combustion heated thermionic device. JPL tasks described include: (1) basic surface experiments; (2) triode converter experiments; (3) design of a cylindrical converter; and (4) high efficiency conversion experiments. (ERA citation 05:010230)

COO-3056-41 PC **A04**/MF **A01**
Thermo Electron Corp., Waltham, MA.
DOE/JPL Advanced Thermionic Technology Program. Progress Report No. 39, April-June 1979. Report No. TE4258/4247-2-80.
1979, 73p
Contract EY-76-C-02-3056

DOE tasks include surface and plasma investigations (surface characterization, spectroscopic plasma experiments, and converter theory); low-temperature converter development (tungsten emitter, tungsten oxide collector and tungsten emitter, nickel collector); component hardware development (hot shell development); and flame-fired CVD silicon carbide converters. JPL tasks include high temperature and advanced converter studies, postoperational diagnostics, and correlation of design interfaces. Progress on each of these tasks is reported. (ERA citation 05:010231)

COO-3056-42 PC **A06**/MF **A01**
Thermo Electron Corp., Waltham, MA.
DOE/JPL Advanced Thermionic Technology Program. Progress Report No. 40, July-August-September 1979.
1979, 115p
Contract EY-76-C-02-3056

The primary long-term goal of the DOE effort at Thermo Electron Corporation is to improve TEC performance to the level that thermionic topping of fossil fuel steam powerplants becomes technically possible and economically attractive. The focus of the JPL program is to develop thermionic conversion technology appropriate for nuclear electric propulsion (NEP) missions. This report covers progress made during the three-month period from July through September 1979. During this period, significant accomplishments in the DOE program include: (1) Demonstration of 2300 hours of stable operation (Silicon Carbide Converter No. 1) in a combustion environment at emitter temperatures at, or above, 1600 K. This test is continuing. (2) Fabrication of two leaktight composite CVD (SiC/C/W) hot shell-emitter structures two inches in diameter. (3) Reproduction of W(100)/O/Zr emitter work function obtained at the Oregon Graduate Center. (4) Formation of an analytical model of the ignited mode thermionic diode which predicts the operating conditions associated with the onset of a double sheath at the emitter. Significant accomplishments in the JPL program include: (1) Demonstration of oxygen enhancement of a molybdenum emitter from a tungsten oxide collector. (2) Development of a technique for casting sapphire prototypic of NEP thermionic reactor system design. (3) Development of a technique for bonding lanthanum hexaboride to rhenium that was stable for 150 hours at temperatures ranging between 1600 and 1700 K. (4) Formulation of an assembly procedure for fabricating thermionic converters on an emitter heat pipe. (ERA citation 05:012066)

COO-4094-60 PC **A03**/MF **A01**
Massachusetts Inst. of Tech., Lexington. Lincoln Lab.
Solar Photovoltaic Project: Materials, Processes, and Testing Activities. Quarterly Report, April 1-June 30, 1979.
S. E. Forman, and M. P. Themelis. 31 Oct 79, 36p
Contract EY-76-C-02-4094

The US Department of Energy has set a 20-year lifetime goal for terrestrial photovoltaic modules. In its capacity as a Photovoltaic Field Tests and Applications Center, Massachusetts Institute of Technology Lincoln Laboratory has established various experimental test sites, ranging in size from 0.1- to 25-kW-peak power, throughout the United States. These sites include modules from several manufacturers and serve as test beds for photovoltaic system components. This report, the fifth in a series of similar reports (1-4), summarizes the activities of the Materials, Processes and Testing Laboratory of the Solar Photovoltaic Field Tests and Applications Project during the three-month period (4/1/79 to 6/30/79). During this period, inspection trips were made to test sites at the University of Texas at Arlington and at Mead, Nebraska. Modules were tested in the field to determine the extent of physical and electrical degradation which had taken place since previous inspections. Several modules were removed from these sites for more detailed laboratory analysis. In addition, degradation analysis of modules from the rooftop of the Chicago Museum of Science and Industry, and failure analysis of modules from the Lincoln Laboratory Rooftop Test Bed and Residential Test Beds was performed. The results of both field testing and the laboratory analyses are reported. (ERA citation 05:011591)

COO-4094-68 PC **A02**/MF **A01**
Massachusetts Inst. of Tech., Lexington. Lincoln Lab.
Photovoltaic Powered 20-HP DC/AC Irrigation System and a 3-KW Nitrogen Generator.
R. F. Hopkinson. 1980, 6p CONF-800106-22
Contract EY-76-C-02-4094
14. photovoltaics specialists conference, San Diego, CA, USA, 7 Jan 1980.

A 25-kWp photovoltaic power system has been providing power for irrigation and crop drying since July 1977 at an agricultural field station of the University of Nebraska, located at Mead, Nebraska. The system was designed and built by Massachusetts Institute of Technology's Lincoln Laboratory under US Department of Energy sponsorship and is being operated jointly by the university and MIT Lincoln Laboratory. The system consists of a 25-kWp PV array, a battery subsystem, a power dump, an inverter, a controller and a data acquisition system. This photovoltaic power system has been used as a test facility in order to test and evaluate a variety of PV-related agricultural applications, including irrigation, crop drying and fertilizer manufacturing. Two interesting applications presently under evaluation are a 20-hp DC/AC-powered irrigation system and an on-site nitrogen fertilizer production unit. (ERA citation 05:011592)

COO-4094-69 PC **A02**/MF **A01**
Massachusetts Inst. of Tech., Lexington. Lincoln Lab.
Performance and Reliability of Photovoltaic Modules at Various MIT LL Test Sites.
S. E. Forman, and M. P. Themelis. 1980, 6p CONF-800106-21
Contract EY-76-C-02-4094
14. photovoltaics specialists conference, San Diego, CA, USA, 7 Jan 1980.

Between March 1977 and the present, MIT Lincoln Laboratory, in conjunction with the US Department of Energy, has placed 85 kW of photovoltaic modules at various experimental test sites in the United States. These sites range in size and function from a 25-kW System Test Facility, where all the components in a PV system are tested, down to a 0.1-kW Environmental Test Site, where modules alone undergo weathering and soil accumulation experiments. To date, 144 modules (amounting to 2.75 kW) of 4533 have experienced electrical failure. This report summarizes the performance and reliability of photovoltaic modules at two experimental test sites: a 25-kW array field at Mead, Nebraska, and a 7.5-kW array field at Arlington, Texas. (ERA citation 05:011593)

COO-4094-71 PC **A02**/MF **A01**
Massachusetts Inst. of Tech., Lexington. Lincoln Lab.
Simulation of the Performance of a 100-KW-Peak Photovoltaic System.
B. L. Grossman, B. L. Brench, L. L. Bucciarelli, and F. J. Solman. 1980, 7p CONF-800106-17
Contract EY-76-C-02-4094
14. photovoltaics specialists conference, San Diego, CA, USA, 7 Jan 1980.

MIT Lincoln Laboratory designed and is currently constructing a 100-kW-peak photovoltaic (PV) power system for the Natural Bridges National Monument (NBNM). NBNM is located in a remote part of southeastern Utah and the PV system will operate in a stand-alone mode (i.e., no tie-in with a utility grid). Backup power will be supplied by an existing diesel-powered generator. The PV system and its individual components are being analyzed through the use of a computer simulation. Useful relationships have been found for system operating characteristics, array output, generator power usage, generator control strategy, storage losses and battery charge/discharge cycles. The system operating voltage can be set to extract maximum power from the array during the winter when that power is needed most. The generator operating strategy can be designed to minimize adverse effects on the batteries. Losses due to storage are offset by surplus array energy and by generator power. (ERA citation 05:013302)

COO-4094-72 PC **A02**/MF **A01**
Massachusetts Inst. of Tech., Lexington. Lincoln Lab.
Energy Balance Associated with the Use of a Maximum Power Tracer in a 100-KW-Peak Power System.
L. L. Bucciarelli, B. L. Grossman, E. F. Lyon, and N. E. Rasmussen. 1980, 5p CONF-800106-16
Contract EY-76-C-02-4094
14. photovoltaics specialists conference, San Diego, CA, USA, 7 Jan 1980.

Design of a stand-alone photovoltaic (PV) system which includes batteries for energy storage requires not only sizing the array power output and battery storage capacity to meet the load, but also fixing the number of battery cells placed in series relative to the number of PV cells in series in order to keep the battery voltage in the neighborhood of the array maximum-power-point voltage during operation. When a maximum-power-point tracker (MPPT) is interposed between the array and the battery, the design task is simplified. The decision to use an MPPT depends primarily on the operating efficiency of the device. The recent development at MIT Lincoln Laboratory of low-cost maximum-power-point trackers capable of efficiencies greater than 98% at the 3-kW level broadens the range of applications where an MPPT can be used to advantage. Hourly simulation results for the 100-kW-peak PV stand-alone system under construction at Natural Bridges National Monument in Utah are compared for the cases with and without maximum power tracking to quantify the advantage of MPPT implementation. (ERA citation 05:011594)

COO-4094-75 PC **A02**/MF **A01**
Massachusetts Inst. of Tech., Lexington. Lincoln Lab.
Residential System Designs for the Northeast and Southwest.
M. C. Russell. 1980, 4p CONF-800106-13
Contract EY-76-C-02-4094
14. photovoltaics specialists conference, San Diego, CA, USA, 7 Jan 1980.

The development of residential photovoltaic power systems as part of the United States Department of Energy photovoltaic program will begin in FY-80. Prototype residential systems for heating, cooling and electric power will be built and evaluated at regional Residential Experiment Stations (RES's). The first RES locations will be in the Northeast and Southwest. The most appropriate system designs for Northeast and Southwest residences have been identified in various studies. Photovoltaic collector systems will be fielded in both the Northeast and Southwest RES facilities. A utility-interactive direct current to alternating current power inverter will be used with no on-site electrical storage. Similar systems using either combined photovoltaic/thermal collectors or separate photovoltaic modules and solar thermal collectors will be fielded at the Northeast RES facility. (ERA citation 05:011595)

COO-4094-78 PC **A02**/MF **A01**
Massachusetts Inst. of Tech., Lexington. Lincoln Lab.
Microprocessor-Based Control of the Photovoltaic Solar Power System for an AM Radio Station.
C. H. Much, and P. J. Rothenheber. 1980, 7p CONF-800306-3
Contract EY-76-C-02-4094
International IECI conference, Philadelphia, PA, USA, 17 Mar 1980.

A microprocessor-based controller for a 15 kW photovoltaic power system powering an AM radio station keeps dc bus voltage between desired limits, governs battery operation, monitors safety conditions, and provides status reporting. The microprocessor also facilitates complicated algorithms that improve performance. The first three months of system operation are presented. (ERA citation 05:011596)

COO-4130-2 PC **A05**/MF **A01**
Dayton Univ., OH. Research Inst.
Third Annual Progress Report on the Electrofluid Dynamic Wind Generator. Final Report, September 15, 1977-September 30, 1978.
J. E. Minardi, M. O. Lawson, and F. L. Wattendorf. May 79, 76p
Contract EY-76-S-02-4130

The objective of the program is to conduct research leading to the development of EFD wind driven generators. In such generators, the wind blows through suitably oriented arrays of electrodes, transports charged particles against an electrical potential gradient, and thereby generates electrical power directly without moving parts. Significant progress has been made in accomplishing major research objectives. During the past year, the effort was directed toward the achievement of three milestones, namely: development of a laboratory method for the production of an adequate supply of suitably low mobility charged droplets for the testing of generator performance; experimental verification of generator performance theory; and development of methods for practical production of charged droplets. (ERA citation 05:011822)

COO-4518-T1 PC **A03**/MF **A01**
Colorado State Univ., Fort Collins. Dept. of Electrical Engineering.
Degradation of ITO/Silicon Solar Cells. Final Report.
C. W. Wilmsen. 1978, 30p
Contract EG-77-S-02-4518

The research under this contract investigated the degradation mechanisms and projected lifetime of indium tin oxide (ITO/P-silicon) solar cells. Both single and polycrystalline silicon cells were investigated. Thermal degradation of the cells was shown to proceed by the growth of an interfacial SiO sub 2 which resulted from oxygen diffusion through the ITO. The growth of the interfacial SiO sub 2 causes reduction in fill factor but not V/sub oc/ or I/sub sc/ until the degradation is severe. While thermal degradation occurs, it proceeds very slowly at 50 exp 0 C and the cell efficiency is projected to remain above 50% of its original value for 10 exp 5 years at this temperature. Cells subjected to illuminated load testing at room temperature for 840 hours showed no reduction in output. However, some changes were noted in the dark characteristics. The mechanism causing the change is not known. Preliminary noise spectral density reliability tests were conducted but the results were inconclusive. (ERA citation 05:013245)

COO-4531-9 PC **A02**/MF **A01**
Institute of Gas Technology, Chicago, IL.
Beneficial Use of Rejected Heat from Electric Power Plants: Summary Final Report.
R. W. Porter. Aug 79, 17p
Contract EC-77-S-02-4531

in situ beneficial use of rejected heat from steam-electric power plants is considered, wherein condenser coolant is used directly in the application without heat exchangers and wherein the relatively low temperatures are useful to the associated process. A major advantage of this approach is the maintenance of low turbine back pressure and high electrical-generating efficiency. The applications include direct discharge into a municipal water supply, interaction with wastewater treatment, and open-field irrigation. In each case, a thermal and economic systems analysis was performed and operational, legal, and other problems were assessed. In the case of the municipal water supply, the savings in cost of closed-cycle cooling and water-heater energy appear to offset operational problems in the water supply and may be sufficient to justify public acceptance. A number of more-advanced wastewater treatment processes would benefit from dilution with a portion of condenser discharge. The treated mixture would serve as makeup for a smaller modified closed-cycle cooling system and the balance would constitute a water product. Unfortunately, open-field irrigation does not seem feasible due to the large land areas required. A number of supporting studies were performed in the area of interaction of cooling systems with the heat-power cycle, and in the area of spray-cooling systems which may be attractive in certain wastewater-treatment processes as well as for conventional closed-cycle and supplemental cooling of electric power plants. (ERA citation 05:013814)

COO-4614-T1 PC **A03**/MF **A01**
Dow Corning Corp., Midland, MI.
Protective Coatings for Front Surface Reflectors. Phase I, Final Report.
W. E. Dennis. Sep 79, 38p
Contract ET-78-C-02-4614

Silicone resins were evaluated as protective coatings for front surface aluminum and silver reflectors. The solar weighted hemispherical reflectances and specular reflectances of float glass squares metallized with silver and aluminum and protected with silicone coatings were measured. The float glass squares metallized with silver and aluminum were highly reflective. The total reflectances of the silver samples were 5 to 7% higher than the aluminized samples. The resin coated aluminum samples were much more specular than the silver samples. Coupling agents used to improve the adhesion of the protective silicone resin coating to the silver surface adverseiy affected the specularities. (ERA citation 05:011688)

COO-4726-10 PC **A04**/MF **A01**
Wayne State Univ., Detroit, MI.
Cuprous Oxide Photovoltaic Cells. Final Report, January 1, 1978-September 30, 1978.
D. Trivich, E. Y. Wang, and R. J. Komp. Oct 78, 52p
Contract ET-78-S-02-4726

Cuprous oxide, with a band gap of 2.0 eV, is a potentially useful material for photovoltaic cells because of low cost and high availability. Previous work on Schottky barrier Cu sub 2 O cells indicated that the low efficiency of 1% could be due to chemical degradation of the junction. Interlayers could be useful in restraining this reaction and could lead to improved cells. In this research using Auger and ESCA surface analysis methods, it was found that copper metal was present at the junction in Al/Cu sub 2 O cells thus supporting the hypothesis of a chemical reaction between the Al and the Cu sub 2 O. MIS cells with interlayers of SiO sub 2 , Sb sub 2 O sub 3 and Si sub 3 N sub 4 showed some dependence of V/sub oc/ on the work function of the metal but AlO/sub x/ interlayers, produced by evaporation of Al in O sub 2 , suffered the chemical degradation, presumably due to incomplete conversion to Al sub 2 O sub 3 in the preparation. The resistivity of Cu sub 2 O can be reduced by annealing at 500 exp 0 (rho approx. 100 to 200 omega cm), by doping of Cu with Cd before oxidation to Cu sub 2 O (rho approx. 150 omega cm), by zone refining and annealing (rho = 36 omega cm) and by doping of Cu sub 2 O melts with CdO (rho = 9 omega cm). (ERA citation 05:009789)

COO-4878-12 PC **A02**/MF **A01**
Massachusetts inst. of Tech., Lexington. Lincoln Lab.
High-Temperature Seal Development for the Share Receiver.
P. O. Jarvinen. 1979, 9p CONF-791221-2
Contract ET-78-S-02-4878
Semiannual conference for advanced solar thermal technology, Phoenix, AZ, USA, 11 Dec 1979.

The development and experimental demonstration of a high-temperature seal for the SHARE ceramic dome cavity receiver is reported. The mechanical contact seal which was tested on one-foot diameter silicon carbide ceramic dome hardware at pressure differentials to four atmospheres and dome temperatures to 2200 exp 0 F (1200 exp 0 C) showed negligible leakage at expected receiver operating conditions. (ERA citation 05:011689)

COO-4881-13 PC **A02**/MF **A01**
Prototech Co., Newton Highlands, MA.
Energy Savings by Means of Fuel Cell Electrodes in Electro-Chemical Industries. Progress Report, August 1, 1979-October 31, 1979.
R. J. Allen, W. Juda, and R. W. Lindstrom. 12 Dec 79, 18p
Contract ET-78-C-02-4881

Initial efforts in studies of the effects of fuel cell electrodes on energy savings in electrochemical processes have been directed toward assembling test hardware and evaluation of a new zinc plant feed. A complete chemical analysis of the feed is reported. Utilizing the 2" x 2" (active electrode area) hardware and techniques developed under Contract No. ET-78-C-02-4881, 6 h zinc electrowinning tests demonstrated a current efficiency of greater than 90% with an energy consumption of 0.54 to 0.55 kWh/lb of zinc. For these tests, 0.1 g/l gelatin was employed as an electrolyte additive and the resultant zinc plates were bright, smooth and compact. (ERA citation 05:012115)

DOE/CS/40046-1(V.1) PC **A12**/MF **A01**
Texas Tech Univ., Lubbock. Dept. of Systems.
Trans-Pecos Photovoltaic Concentration Experiment. Final Report for Phase-I System Design, 6 June 1978-28 February 1979.
W. M. Marcy, and R. A. Dudek. 30 Mar 79, 260p
Contract ET-78-C-04-4269

The Trans-Pecos Photovoltaic Concentrating Experiment is the design of a 200 kWe peak photovoltaic concentrating system applied to deep well irrigation in the Trans-Pecos region of Texas. The site selected is typical of deep well irrigation in arid regions of Texas, New Mexico, and Arizona. The existing well utilizes a 200 horse power, three phase, 480 volt induction motor to lift water 540 feet to irrigate 380 acres. The Trans-Pecos Photovoltaic Concentration (PVC) system employs a two axis (azimuth-elevation) tracking parabolic concentrator module that focuses sunlight at 38X concentration on two strings of actively cooled silicon solar cells. The direct current from a field of 102 collector modules is converted by a maximum power point electric power conditioning system to three phase alternating current. The power from the power conditioning system is connected through appropriate switchgear in parallel with the utility grid to the well's induction motor. The operational philosophy of the experiment is to displace daytime utility power with solar generated electric power. The solar system is sized to provide approximately 50 percent of the 24 hour energy demand of the motor. This requires an energy exchange with the utility since peak solar power (200 kWe) generated exceeds the peak motor demand (149.2 kWe). The annual energy production is projected to be 511 Mwh using El Paso, Texas solar TMY data. System electrical power production efficiency is projected to be 7.4 percent at the design point, and 7.0 percent on an annual electrical energy production basis. The system is projected to provide 37.8 percent of the 24 hour energy demand of the motor at the design point of March 10, excluding energy delivered to the grid in excess of motor demand. The total energy produced is projected to be 39.0 percent of the 24 hour energy demand of the motor at the design point of March 10. (ERA citation 05:011599)

DOE/CS/8720-3 PC **A07**/MF **A01**
Arizona Power Authority, Phoenix.
Southwest Project: Resource/Institutional Requirements Analysis. Volume III. Systems Integration Studies.
Dec 79, 128p
Contract EM-77-C-01-8720

The purpose of this project is to provide information to DOE which can be used to establish its plans for accelerated commercialization and market penetration of solar electric generating plants in the southwestern region of the United States. The area of interest includes Arizona, California, Colorado, Nevada, New Mexico, Utah, and sections of Oklahoma and Texas. The system integration study establishes the investment that utilities could afford to make in solar thermal, photovoltaic, and wind energy systems, and to assess the sensitivity of the break-even cost to critical variables including fuel escalation rates, fixed charge rates, load growth rates, cloud cover, number of sites, load shape, and energy storage. This information will be used as input to Volume IV, Institutional Studies, one objective of which will be to determine the incentives required to close the gap between the break-even investment for the utilities of the Southwest and the estimated cost of solar generation. (ERA citation 05:011434)

DOE/CS/94268-1 PC **A10**/MF **A01**
Research Triangle Inst., Research Triangle Park, NC.
RTI Photovoltaic Concentrator Applications Experiment. Phase I. System Design. Final Report, 1 June 1978-28 February 1979.
R. M. Burger, R. A. Whisnant, W. C. Drake, D. R. Daluge, and R. D. Alberts. Mar 79, 216p RTI-1638/00-1F
Contract ET-78-C-04-4268

An experiment has been designed in which a 100 kW photovoltaic concentrator system serving the electrical load provided by an energy-efficient office-laboratory building will be built and operated in the Research Triangle Park of North Carolina. Since the purpose of the experiment is to provide the essential data for design and installation of future operational systems, the system is designed for operational flexibility. In its main operational mode, a defined primary load is diverted from the utility during all peak-demand periods. This requires the use of 1000 kWh of lead-acid batteries for energy storage. Other operational modes provide for obtaining data on peak demand reduction, on alternative battery use strategies, and on system performance with an isolated load. Operation of the system in parallel with utility-supplied power requires that the photovoltaic array outputs be inverted and that the power be controlled to achieve the operational objectives. Ten 2-axis tracking arrays consisting of 70X parabolic concentrators are used. The system will provide approximately 103 megawatt-hours of power annually to the load and the design is compatible with future retrofits including more efficient solar cells, higher concentration ratios, thermal energy collection, and other technological developments, ensuring its usefulness in research and development beyond the PRDA-35 experiment. (ERA citation 05:011600)

DOE/EIA-0095 PC **A17**/MF **A01**
Department of Energy, Washington, DC. Energy Information Administration.
Inventory of Power Plants in the United States: April 1979.
K. J. Shanks. 25 May 79, 384p

This inventory of power plants provides a comprehensive list of existing, standby, out of service, retired, and projected electric generating units in the United States. The data base which is the source of data for this publication is comprised of the following three files: Generating Unit Reference File (GURF); Company Information File (CIF); and Joint Ownership File (JOF). The GURF is a source of physical characteristics for all existing and currently planned generating units in the US. In addition, it contains information about units which were in the file as existing units and have since retired, and units which were scheduled to be constructed but have been cancelled from a utility's plans. The CIF, a companion file to the GURF, is a source of several descriptive characteristics of each electric utility, such as National Electric Reliability Council (NERC) region and Power Pool affiliations. The JOF, another companion file to the GURF, is a source of information on the share of ownership of a generating unit when there is multiple ownership by utilities. (ERA citation 05:010035)

DOE/ER-0038 PC **A07**/MF **A01**
Battelle Columbus Labs., OH.
Preliminary Materials Assessment for the Satellite Power System (SPS).
R. R. Teeter, and W. M. Jamieson. Jan 80, 131p
Contract W-7405-ENG-92

Presently, there are two SPS reference design concepts (one using silicon solar cells; the other using gallium arsenide solar cells). A materials assessment of both systems was performed based on the materials lists set forth in the DOE/NASA SPS Reference System Report: Concept Development and Evaluation Program. This listing identified 22 materials (plus miscellaneous and organics) used in the SPS. Tracing the production processes for these 22 materials, a total demand for over 20 different bulk materials (copper, silicon, sulfuric acid, etc.) and nealy 30 raw materials (copper ore, sand, sulfur ore, etc.) was revealed. Assessment of these SPS material requirements produced a number of potential material supply problems. The more serious problems are those associated with the solar cell materials (gallium, gallium arsenide, sapphire, and solar grade silicon), and the graphite fiber required for the satellite structure and space construction facilities. In general, the gallium arsenide SPS option exhibits more serious problems than the silicon option, possibly because gallium arsenide technology is not as well developed as that for silicon. Results are presented and discussed in detail. (ERA citation 05:013304)

DOE/ET/20429-1 PC **A09**/MF **A01**
Westinghouse Research and Development Center, Pittsburgh, PA.
Cadmium Sulfide/Copper Sulfide Heterojunction Cell Research. Final Report, September 30, 1977-July 31, 1979.
J. R. Szedon, F. A. Shirland, W. J. Biter, T. W. O'Keeffe, and J. A. Stoll. 31 Jul 79, 186p
Contract EG-77-C-03-1577

The objective of this program is to conduct research on solar cells of the copper sulfide/cadmium sulfide (and cadmium sulfide-zinc sulfide alloy) type with the goal of producing thin film cells capable of 10% AM1 conversion efficiency with less than 5% degradation in performance over a period of 20 years. New evaluation methods reveal cell microstructure details (grain size, Cu sub 2 S penetration into grain boundaries, etch pit depth and density) whose modification and control should allow reproducible achievement of at least 9% conversion efficiency. Cell degradation primarily involves changes in heterojunction collection efficiency, not minority carrier transport in the thin Cu sub 2 S, light absorbing layer. Analysis of current technology predicts a selling price of $0.53/peak watt (1975 dollars) for glass encapsulated, 8% efficient modules. More conservative material use, especially gold grid electrode, should allow a selling price of $0.38/peak watt. Suggestions are made for further work to meet the program performance and cost objectives. (ERA citation 05:013246)

DOE/ET/23006-1 PC **A03**/MF **A01**
Joint Center for Graduate Study, Richland, WA.
Investigation of Solar Cells Based on Cu sub 2 O. Quarterly Progress Report, May 1-July 31, 1979.
L. C. Olsen. 7 Sep 79, 35p
Contract AC04-79ET23006

Efforts during this quarter have involved a detailed study of photocurrent from Cu/Cu sub 2 O Schottky barriers, development of a MBE system, and studies of reactively sputtered ZnO films. Optical constants were determined for Cu films as a function of film thickness and utilized to determine optimum AR coating thicknesses to maximize the photocurrent from Cu/Cu sub 2 O cells. Using results of these analyses, an AM1 photocurrent of 7.4 mA/cm exp 2 has been obtained. Fabrication and purchasing of parts for a three-source MBE system has progressed well. Conductive and transparent ZnO films were deposited by reactively sputtering zinc. Films exhibiting a sheet resistance in the range of 10 exp 3 to 10 exp 5 omega /cm exp 2 have been deposited on quartz. (ERA citation 05:013248)

DOE/ET/23047-T1 PC **A03**/MF **A01**
Exxon Research and Engineering Co., Linden, NJ. Advanced Energy Systems Labs.
Thin Film Polycrystalline Silicon Solar Cells. Quarterly Report No. 2, April 1, 1979-June 30, 1979.
A. K. Ghosh, T. Feng, H. P. Maruska, and C. Fishman. 1979, 45p
Contract AC02-79ET23047

The theory of polycrystalline solar cells that was reported last quarter has been entended by introducing effects due to the reduction of grain boundary states. The results show that a large improvement in efficiency can be attained either by increasing the grain size or by passivating the grain boundary states to reduce the number of recombination centers. Experimental results are presented to show grain size distribution in Wacker polycrystalline silicon. Preliminary Hall mobility measurements are presented as a function of temperature. Experimental results and analysis of diffused p on n cells are reported. Preliminary studies of grain boundary passivation and stability of SnO sub 2 /n-Si solar cells are presented. (ERA citation 05:013252)

DOE/ET/32208-3 PC **A04**/MF **A01**
Johns Hopkins Univ., Laurel, MD. Applied Physics Lab.
Vacuum Deposited Polycrystalline Silicon Films for Solar Cell Applications. Quarterly Report, April 1-June 30, 1979.
C. Feldman, and F. G. Satkiewicz. Aug 79, 55p
Contract ET-78-A-03-2208

Research is being conducted on grain growth phenomena and interface interactions pertaining to an all-vacuum deposition technique for fabricating thin-film polycrystalline silicon solar cells. Investigations this quarter dealt primarily with the structure silicon/TiB sub 2 /alumina substrate, which seems to be the most satisfactory from the standpoint of stability and potential applicability to low-cost solar cells. Secondary ion mass spectrometry, scanning electron microscopy, and x-ray diffraction analysis and revealed important information concerning growth processes and interfacial interactions. Deposition of silicon in the presence of hydrogen (approx. 5 x 10 exp -5 Torr) resulted in devices inferior to those fabricated in high vacuum. It is doubtful that much, if any, hydrogen remained in the film under the high temperature processing conditions. Silicon growth from the TiB sub 2 coated substrates was observed to start from larger seeds than was observed on bare alumina substrates. The larger silicon crystallites observed on the TiB sub 2 /alumina are believed to arise from growth on an intermediate Ti-Si phase. A series of experiments on top electrode preparation indicates that Ti/Ag electrodes heated for 30 min at 500 exp 0 C in air gives the best results for the polycrystalline devices as they are presently constructed. (ERA citation 05:013254)

DOE/ID/01779-1 PC **A03**/MF **A01**
CH2M Hill, Corvallis, OR.
Johnson Lake Inlet Low-Head Hydroelectric Project. Feasibility Assessment Report.
Feb 79, 33p
Contract EW-78-F-07-1779

The feasibility of a low-head hydroelectric plant at the Johnson Lake Inlet Structure, a water level control dam in Nebraska was evaluated. On the basis of technical, economic, legal, and environmental studies it was concluded that the project has a benefit-cost ratio of less than one, and is therefore not economically feasible and further study is not recommended. (ERA citation 05:011423)

DOE/JPL/954344-1 PC **A09**/MF **A01**
South Carolina Univ., Columbia. Coll. of Engineering.
Web-Dendritic Growth. Final Report, October 1975-August 1977.
R. B. Hilborn, Jr., J. W. Faust, Jr., and C. Rhodes. 1977, 188p
Contract NAS-7-100-954344

This final report gives the results of work performed by the University of South Carolina to develop methods of producing large areas of silicon ribbon by the web-dendritic method. A prototype web-dendritic growth machine, on hand at the beginning of the contract, was assembled and activated. A program for investigating the role of the various machine design parameters on the growth of web-dendritic ribbon was carried out during the duration of the contract. The development of the machine proceeded to the point where ribbons could be reproducibly grown up to lengths of 1 meter, with widths increasing linearly from a minimum, at the initiating seed button, up to 1 cm, at the point of termination of growth. Considerable thermal data was collected and evaluations were made of actual seeding and growth for variations in a large number of parameters affecting heat loss. From this we found for achieving suitable growth that the mechanical system should be very rigid and stable, and the tolerances and specifications of the quartz crucibles must be far tighter than normal quartz tolerances. The widening rates of the ribbons were found to be a function of the temperature gradient rather than the temperature differences alone. A twin spacing in the seed of 3 mu - 2 mu was found to be unfavorable for growth; whereas spacing of .9 mu - 2 mu and 8 mu - 2 mu were favorable. It was found, however, that the spacing of 8 mu - 2 mu sets an upper limit of 4 cm/min on the maximum achievable rate. Extensive thermal modeling studies were carried out to investigate the effect of furnace design parameters on the temperature distributions in melt and the growth of the dendritic-web ribbon. From this study it was found that the pull rate of the ribbon is strongly dependent on the temperature of the top thermal shield, the spacing between this shield and the melt, and the thickness of the growing web. (ERA citation 05:013259)

DOE/JPL/954355-2 PC **A06**/MF **A01**
Mobil Tyco Solar Energy Corp., Waltham, MA.
Large Area Silicon Sheet by EFG. Second Quarterly Report, April 1-June 30, 1979.
15 Jul 79, 101p
Contract NAS-7-100-954355

In Furnace No. 1 during this quarter, experiments were conducted in which the total argon purge rate in this furnace was decreased. A number of extremely significant changes in the crystallographic structure and electronic quality of the ribbons were observed in these experiments. Ribbon segments were grown in which the equilibrium defect structure was no longer present and the electrical properties improved to the extent that cells of 50 cm exp 2 area having AM1 efficiencies over 11% could be prepared. In Furnace No. 3A, the final five-ribbon demonstration run was performed. The furnace performed nearly flawlessly over the 15 hour run during which approx. 30 meters of 5 cm wide ribbon were grown at a rate of approx. 3.3 cm/min from each of the five cartridges. Initial evaluation of a small lot of 45 cm exp 2 solar cells of approx. 9% (AM1) efficiency. Subsequent to this final multiple demonstration run, the furnace was converted to be operated with three 10 cm width cartridges, plus a melt replenishment unit. This conversion is now complete, and the first growth runs using one cartridge and the melt replenisher have produced approx. 4 meters of 10 cm wide ribbon at a growth rate of 3.5 cm/min. In Furnace 17, work on stress has continued, and a basic investigation of stress and buckle generation in the ribbon has shown this to be a fairly complex problem at high growth rates. However, at rates up to perhaps 5 cm/min, the problem may be manageable through improvements in puller design and ribbon guidance. Also on this machine, the work with automatic control designs is making progress, and in an appendix to this report, a very comprehensive discussion of the control dynamics during EFG growth is provided. (ERA citation 05:013260)

DOE/JPL/954355-9 PC **A05**/MF **A01**
Mobil Tyco Solar Energy Corp., Waltham, MA.
Large Area Silicon Sheet by EFG. First Quarterly Report, January 1, 1979-March 31, 1979.
F. V. Wald. 15 Apr 79, 85p
Contract NAS-7-100-954355

In growth station JPL No. 1 the work during this quarter centered around trying to evaluate any influences on ribbon quality which might be caused by various materials of construction which are used in the growth furnace. At the present level of ribbon quality, which has produced 8.5% to 9.5% efficient solar cells, no particular influence of any furnace part was detected. The experiments rather led to the suspicion that the general environment and the somewhat unoptimized materials handling

procedures might be responsible for the current variations in ribbon quality and that, therefore, continuous work with this furnace under rather more stringent environmental conditions and operating procedures could perhaps improve materials quality to some extent. The work on Machine 3A (the multiple furnace) was continued with two multiple growth runs being performed. In these runs, the melt replenishment system performed poorly and extensive modifications to it have been designed to make reliable melt feeding for five ribbon growth possible. Although in the first quality assessment runs ever performed with the melt replenishment system diffusion lengths nearly as great as those found in non-melt replenished runs were found, we have not yet apparently identified all the factors affecting SiC density in ribbons grown from this large volume furnace. Thus, cell performance on multiple ribbon has not yet been demonstrated. The 10 cm width growth cartridge was also completely constructed during this quarter and will be checked out as soon as the multiple runs have been completed. Also, certain new characterization techniques for wide ribbons as well as on stress measurements and growth dynamics experiments are reported, the latter being a necessary precursor to the design of automatic control techniques. (ERA citation 05:009792)

DOE/JPL/954373-11 PC **A03**/MF **A01**
Crystal Systems, Inc., Salem, MA.
Silicon Ingot Casting - Heat Exchanger Method Multi-Wire Slicing - Fixed Abrasive Slicing Technique, Phase III. Silicon Sheet Growth Development for the Large Area Sheet Task of the Low-Cost Solar Array Project. Quarterly Progress Report No. 3, April 1-June 30, 1979.
F. Schmid, and C. P. Khattak. Jul 79, 36p
Contract NAS-7-100-954373

Ingot casting has been scaled up to 16 cm x 16 cm square cross-section size weighing up to 8.1 kg. The high degree of crystallinity has been maintained in the large ingot. For large sizes, the non-uniformity of heat treatment causes chipping of the surface of the ingot. Significant effort and progress have been made in the development of a uniform graded structure in the silica crucibles. The high speed slicer has been modified so that the blade-head weight is reduced to 37 lb. This has allowed higher surface speeds of up to 500 fpm. Slicing of 10 cm diameter workpieces at these speeds has increased the throughput of the machine to 5.7 mils/min, 0.145 mm/min, 50% more than the projected cutting rates used in the economic analysis. (ERA citation 05:009794)

DOE/JPL/954376-8 PC **A03**/MF **A01**
Motorola, Inc., Phoenix, AZ. Semiconductor Group.
Laser-Zone Growth in a Ribbon-to-Ribbon (RTR) Process Silicon Sheet Growth Development for the Large Area Silicon Sheet Task of the Low Cost Solar Array Project. Technical Quarterly Report No. 9, October 1-December 31, 1978. Motorola Report No. 2256/12.
A Baghdadi, R. W. Gurtler, R. Legge, B. Sopori, and M. J. Rice. 1978, 27p
Contract NAS-7-100-954376

Breakthroughs were achieved in two areas critical to the RTR process. A series of flat polycrystalline ribbons measuring 5 cm x 61 cm was grown and successfully separated from 24" long Mo substrates. Solar cells on gettered RTR silicon were grown from pre-etched (greater than or equal to 1/2 mil) CVD feedstock. The best cell had a conversion efficiency of 10.6%, with V/sub oc/ = 0.565 volts, I/sub sc/ = 29.8 ma/cm exp 2 , and a fill factor of 63%. The low fill factor does indicate that still higher efficiencies can be attained on this material by improving the processing sequence. The economic analysis for the overall RTR process has been updated in response to technological progress. The total price for the overall process, including feedstock, was projected at $19 to $23/m exp 2 , assuming multiple ribbon growth. (ERA citation 05:009795)

DOE/JPL/954376-9 PC **A03**/MF **A01**
Motorola, Inc., Phoenix, AZ. Semiconductor Group.
Laser-Zone Growth in a Ribbon-to-Ribbon (RTR) Process Silicon Sheet Growth Development for the Large Area Silicon Sheet Task of the Low Cost Solar Array Project. Technical Quarterly Report No. 10, January 1-March 31, 1979.
A. Baghdadi, R. W. Gurtler, R. Legge, B. Sopori, and M. J. Rice. 1979, 32p
Contract NAS-7-100-954376

This quarter has witnessed appreciable progress in achieving high efficiency on RTR solar cells, with an average efficiency of 9.1% on the most recent lot. The best cell to date has a measured efficiency of 11.3%. A new technique for growing limited-length ribbons continually has been demonstrated. This Rigid Edge technique can be used to recrystallize about 95% of the polyribbon feedstock. A major advantage of this method is that only a single, constant length silicon ribbon is handled throughout the entire process sequence; this may be accomplished using cassettes similar to those presently in use for processing Czochralski wafers. Thus a transition from Cz to ribbon technology can be smoothly affected. The maximum size being considered, 3" x 24", is half a square foot and will generate 6 watts for 12% efficiency at 1 sun. Silicon dioxide has been demonstrated as an effective, practical diffusion barrier for use during the polyribbon formation. Two different approaches for using the silicon dioxide are being pursued. (ERA citation 05:009796)

DOE/JPL/954471-11 PC **A02**/MF **A01**
SRI International, Menlo Park, CA.
Novel Duplex Vapor-Electrochemical Method for Silicon Solar Cells. Quarterly Progress Report No. 14, May 1-July 31, 1979.
L. Nanis, A. Sanjurjo, and K. Sancier. 31 Aug 79, 20p
Contract NAS-7-100-954471

Current work on the reaction between gaseous SiF sub 4 and solid Na has proceeded with the following objectives: (1) obtain data needed for plant design by scaling up the reaction to produce greater amounts of reaction product; (2) increase reaction rate and overall Si production rate; (3) increase the efficiency of the reaction so that less unreacted Na and less Na sub 2 SiF sub 6 are produced; and (4) produce large amounts of reaction product for use in studies of Si recovery by melt separation. The SiF sub 4 -Na reaction system has been scaled up to a reactor i.d., of 13 cm; the capacity of the Na chip feeder has also been increased. The system can now produce 5-kg batches of reaction product (mixed Si and NaF) at a production rate of 1.2 kg Si per hour. The melt-separation system has been modified to routinely melt 5-kg batches of mixed reaction product fed in a continuous mode at a production rate of 0.5 kg Si per hour. Support studies of Si coalescence show NaOH may be added to the NaF melt in amounts up to 5 wt % before there is any tendency for the Si to form large drops rather than a single pool. (ERA citation 05:013261)

DOE/JPL/954521-10 PC **A02**/MF **A01**
Spire Corp., Bedford, MA.
Integral Glass Encapsulation for Solar Arrays. Quarterly Progress Report No. 10.
Jun 79, 18p
Contract NAS-7-100-954521

This is the tenth quarterly report under a JPL/DOE program for the development of permanent, integral glass encapsulation of terrestrial solar photovoltaic arrays by electrostatic bonding (ESB). The goal of this program is to develop electrostatic bonding to the point of being a cost-effective, practical, and automatable process that can be employed for large-scale production of arrays with lifetimes of more than 20 years. Electrostatic bonding is a technique for forming permanent bonds between silicon (or other materials) and glass, without the use of adhesives. The bond is formed quickly and, once formed, can be stronger than either of the materials being joined. The inherent strength of the seal makes this an extremely durable encapsulation method, and the simplicity of the process makes it suitable for automation. Economic analyses have shown that electrostatic bonding can meet the 1986 LSA price goals. Two basic types of electrostatically bonded modules were demonstrated during Phase II of this program, both based on an integral glass superstrate assembly. A number of conventional backings can be used to complete the encapsulation, or a back glass can be attached by electrostatic bonding for ultimate durability. Both module types have proved their reliability in accelerated environmental testing. In the present program phase, these fundamental designs will be scaled up to a larger size - to the maximum possible using existing equipment - and routine, consistent module production will be demonstrated. (ERA citation 05:013262)

DOE/JPL/954786-6 PC **A04**/MF **A01**
Spire Corp., Bedford, MA.
Development of Pulsed Processes for the Manufacture of Solar Cells. Quarterly Progress Report No. 4, September 15-December 15, 1978.
Jan 79, 55p
Contract NAS-7-100-954786

This report describes the first quarter results under the continuation of a program to develop ion implantation, pulse processes, and the equipment for the automated production of silicon solar cells. The report describes the development status of the process based upon ion implantation for the introduction of junctions and back surface fields. A process sequence is presented employing ion implantation and pulse processing. Efforts to improve throughput and decrease process element costs for furnace annealing are described. Design studies for a modular 3,000 wafer per hour pulse processor are discussed. (ERA citation 05:011446)

DOE/JPL/954796-6 PC **A08**/MF **A01**
Moore School of Electrical Engineering, Philadelphia, PA.
Analysis and Evaluation in the Production Process and Equipment Area of the Low-Cost Solar Array Project. Quarterly Report, January-April 1979.
H. Goldman, and M. Wolf. Jun 79, 175p
Contract NAS-7-100-954796

Significant economic and technical data on the current front junction formation processes of Spectrolab's gaseous diffusion, and of involving the Varian-Extrion 200 to 1000 implanter were tabulated, and were used to judge the feasibility of diffusion proposals by Motorola and RCA and ion implantation proposals by Lockheed, Motorola, RCA, and Spire to meet future LSA-JPL guidelines. Cost calculations, consistent with the SAMICS methodology, were performed for the junction formation processes studied. (ERA citation 05:011447)

DOE/JPL/954817-4 PC **A04**/MF **A01**
RCA Labs., Princeton, NJ.
Epitaxial Silicon Growth for Solar Cells. Final Report.
R. V. D'Aiello, P. H. Robinson, and D. Richman.
Apr 79, 64p
Contract NAS-7-100-954817

The objectives of this contract were: (1) to determine the feasibility of silicon epitaxial growth on low-cost silicon substrates for the development of silicon sheet capable of producing low-cost, high efficiency solar cells; (2) to achieve a goal of 12% (AM-0) efficient solar cells fabricated on thin epitaxial layers (<25 mu m) grown on low-cost substrates; and (3) to evaluate the add-on cost for the epitaxial process and to develop low-cost epitaxial growth procedures for application in conjunction with low-cost silicon substrates. The basic epitaxial procedures and solar-cell fabrication and evaluation techniques are described, followed by a discussion of the development of baseline epitaxial solar-cell structures, grown on high-quality conventional silicon substrates. This work resulted in the definition of three basic structures which reproducibly yielded efficiencies in the range of 12 to 13.7%. These epitaxial growth procedures and baseline structures were then used to grow diagnostic layers and solar cells on four potentially low-cost silicon substrates. A description of the crystallographic properties of such layers and the performance of epitaxially grown solar cells fabricated on these materials is given. The major results were the achievement of cell efficiencies of 10.6 to 11.2% on multigrained substrates and approx. 13% on a low-cost single-crystal substrate. An advanced epitaxial reactor, the Rotary Disc, is described. The results of growing solar-cell struc-

tures of the baseline type and on low-cost substrates are given. The add-on cost for the epitaxial process is assessed. These cost estimates show a value of approx. 0.46/W using existing or near-term technologies and project an add-on cost of $0.10/W for future reactors. (ERA citation 05:008252)

DOE/JPL/954822-1 PC **A04**/MF **A01**
Solarex Corp., Rockville, MD.
High Efficiency, High Density Terrestrial Panel. Final Report.
J. Wohlgemuth, M. Wihl, and T. Rosenfield. Feb 79, 68p
Contract NAS-7-100-954822

The design and expected performance of large-area close-packed square and rectangular solar cell arrays are described. This includes the basic properties of the solar cells and calculations performed during the design stage and calculations to predict the expected results. A description of the module design, the rationale for, and the specifications of the components to be used in the modules, is given. The test results are given, which includes the results of pre-production humidity and thermal cycling testing, as well as the final test results from measurements both at Solarex and at JPL. An economic analysis of high density panel production, as well as design recommendations and conclusions drawn from this program are included. (ERA citation 05:011448)

DOE/JPL/954847-4 PC **A10**/MF **A01**
Motorola, Inc., Phoenix, AZ. Semiconductor Group.
Phase 2 of the Automated Array Assembly Task of the Low-Cost Silicon Solar Array Project. Annual Report.
M. G. Coleman, L. P. Grenon, E. M. Pastirik, R. A. Pryor, and T. G. Sparks. Nov 78, 212p
Contract NAS-7-100-954847

This report presents the results of investigations and analyses of an advanced process sequence for manufacturing high efficiency solar cells and modules in a cost-effective manner. The entire process sequence is presented and discussed step by step. Emphasis is on process simplicity and minimizing consumed materials. The process sequence incorporates texture etching, plasma processes for damage removal and patterning, ion implantation, low pressure silicon nitride deposition, and plated metal. A reliable module design is presented. Specific process step developments are presnted. Further, a detailed cost analysis has been performed to indicate future areas of fruitful cost reduction effort. Finally, recommendations for advanced investigations are presented. (ERA citation 05:013264)

DOE/JPL/954853-5 PC **A03**/MF **A01**
Spectrolab, Inc., Sylmar, CA.
Array Automated Assembly. Phase 2. Quarterly Report for Period Ending March 31, 1979.
W. E. Taylor, N. Mardesich, B. Edwards, S. Bunyan, and A. Garcia. May 79, 35p
Contract NAS-7-100-954853

Research on the technology readiness of a proposed process sequence for the low-cost fabrication of photovoltaic modules is described. Integration of the process sequence using non-textured 2.125 inch square wafers was initiated during this period. Considerable difficulties were encountered requiring process and material modifications. These include: (1) replacement of N-250 spray-on diffusion source with PX-10 source; and (2) modification of the firing cycles for printed silver and printed aluminum contacts is required to accomodate the change of wafer size and shape. Preliminary results from cells processed through the entire process sequence except laser scribe and spray on AR coating indicate that the process sequence is feasible. Indicated cell conversion efficiency is 13 to 15%, however, the process at this point is plagued with low shunt resistance and high series resistance in the cells produced. (ERA citation 05:011449)

DOE/JPL/954873-7 PC **A02**/MF **A01**
Westinghouse Research and Development Center, Pittsburgh.
Phase 2 of the Array Automated Assembly Task for the Low Cost Solar Array Project. Quarterly Report No. 7, April 1-June 30, 1979.
R. B. Campbell, P. Rai-Choudhury, E. J. Seman, A. Rohatgi, and J. R. Davis. 5 Sep 79, 24p
Contract NAS-7-100-954873

The major objective of this program is to define and verify a process sequence for the fabrication of solar cell modules from dendritic web silicon. Another objective is the development of key process steps. The process sequence and the individual steps must be amenable to automation and low cost manufacturing methods so that the target selling price of $0.70/watt peak (1980$ in 1986) can be achieved. Two process specifications supplied by other contractors have been tested. The Al Silk Screening Process by Spectrolab resulted in cells comparable to those from sputtered Al. The electroless plating of contacts specification supplied by Motorola could be used only with extensive modification. Several experiments suggest that there is some degradation of the front junction during the A1 BSF formation. A SAMICS cost analysis of this process yielded a selling price of $0.75/watt peak in 1980$. (ERA citation 05:013266)

DOE/JPL/954882-19 PC **A02**/MF **A01**
MB Associates, San Ramon, CA.
Process Development for Automated Solar Cell and Module Production. Task 4. Automated Array Assembly. Quarterly Report No. 4.
J. J. Hagerty. 15 Oct 79, 24p MB-R-79/98
Contract NAS-7-100-954882

Construction of the components of an automated solar cell layup and interconnect system is now complete. This system incorporates a Unimate 2000 B industrial robot with an end effector consisting of a vacuum pick up and induction heating coil. The robot interfaces with a smart cell preparation station which correctly orients the cell, applies solder paste and forms and positions the correct lengths of interconnect lead. The system is controlled and monitored by a TRS-80 micro computer. The entire system is presently undergoing integration prior to formal testing. A survey of elastomer manufacturers has shown transfer molded EPDM to be a strong candidate for the edge sealing material. (ERA citation 05:013267)

DOE/JPL/955089-3 PC **A04**/MF **A01**
Optical Coating Lab., Inc., City of Industry, CA. Photoelectronics Div.
Silicon Solar Cell Process Development, Fabrication and Analysis. Third Quarterly Report, January 1-March 31, 1979.
H. I. Yoo, P. A. Iles, and D. P. Tanner. 1979, 75p
Contract NAS-7-100-955089

The objective of this program is to investigate, develop, and utilize technologies appropriate and necessary for improving the efficiency of solar cells made from various unconventional silicon sheets. Work has progressed in fabrication and characterization of solar cells from cast silicon by heat exchanger method (Crystal Systems), EFG (RH) ribbon (Mobil Tyco) and silicon on ceramic (Honeywell). Silicon blanks (2 x 2 cm) were prepared from the HEM cast silicon and EFG ribbon, using conventional slicing techniques, and fabricated using a standard process typical of those used currently in the silicon solar cell industry. Also a back surface field (BSF) process and other process modifications were included in processing additional slices. Relatively large area (about 15 cm exp 2) solar cells were fabricated from silicon on ceramic substrates using a standard process that can be easily adapted to these substrates. Evaluation of the SOC solar cells has not been completed in this reporting period. The performance parameters measured included open circuit voltage, short circuit current, curve fill factor, and conversion efficiency (all taken under AMO illumination). Also measured for typical cells were spectral response, dark I-V characteristics, minority carrier diffusion length, and photoresponse by fine light scanning. The results were compared to the properties of cells made from the conventional single crystalline Czochralski silicon with an emphasis on statistical evaluation. Limited efforts were made to identify defects which will influence solar cell performance. (ERA citation 05:009799)

DOE/JPL/955089-4 PC **A09**/MF **A01**
Optical Coating Lab., Inc., City of Industry, CA. Photoelectronics Div.
Silicon Solar Cell Process Development, Fabrication and Analysis. Phase I. Annual Report, June 15, 1978-June 15, 1979.
H. I. Yoo, P. A. Iles, and D. P. Tanner. 1979, 178p
Contract NAS-7-100-955089

This program has investigated, developed and utilized technologies appropriate and necessary for improving the efficiency of solar cells made from various unconventional silicon sheets. During this reporting period, work has progressed in fabrication and characterization of solar cells from RTR ribbons (Motorola), EFG (RF and RH) ribbons (Mobil-Tyco), dendritic webs (Westinghouse), Silso wafers (Wacker), cast silicon by HEM (Crystal Systems), silicon on ceramic (Honeywell) and continuous Czochralski ingots (Hamco). Solar cells were fabricated using a standard process typical of those used currently in the silicon solar cell industry. Also back surface field (BSF) processing and other process modifications were included to give preliminary indications of possible improved performance. The parameters measured included open circuit voltage, short circuit current, curve fill factor, and conversion efficiency (all taken under AMO illumination). Also measured for typical cells were spectral response, dark I-V characteristics, minority carrier diffusion length, and photoresponse by fine light spot scanning. The results were compared to the properties of cells made from conventional single crystalline Czochralski silicon with an emphasis on statistical evaluation. Limited efforts were made to identify growth defects which will influence solar cell performance and discussion is given on the difficulties experienced in processing the sheets using near-conventional methods. (ERA citation 05:013269)

DOE/JPL/955131-1 PC **A02**/MF **A01**
Silicon Technology Corp., Oakland, NJ.
Development of Methods of Producing Large Areas of Silicon Sheet by the Slicing of Silicon Ingots Using Inside Diameter (ID) Saws. First Quarterly Report.
P. Aharonyan. 1979, 24p
Contract NAS-7-100-955131

An STC 16 inch automated ID slicing machine (Model SMA-4401) is being used for this effort. The saw has been modified to accept an STC Programmable Electric Feed System, STC Crystal Rotating System and an STC Dyna-Track Blade Monitoring and Control System. The saw and accessories will be used to slice 100 mm diameter single crystal silicon ingots while rotating them. The automated saw will automatically recover the wafers and load them into a cassette. The amount of material lost during slicing is being reduced by using smaller blades than ones normally used to slice 100 mm wafers. Some blades have been manufactured with cutting edge thickness as low as 0.20 mm. Initial slicing runs on 75 mm diameter silicon has been successful on blades in the 0.23 to 0.24 mm cutting edge thickness range. The thinner blades will be used to slice 100 mm silicon while rotating the boule. (ERA citation 05:013270)

DOE/JPL/955149-1 PC **A04**/MF **A01**
Burt, Hill, Kosar, Rittlemann, and Associates, Butler, PA.
Residential Photovoltaic Module and Array Requirements Study. Final Report.
Jun 79, 63p
Contract NAS-7-100-955149

Burt Hill Kosar Rittelmann Associates has conducted a study to identify design requirements for photovoltaic modules and arrays used in residential applications. Building codes and referenced standards were reviewed for their applicability to residential photovoltaic array installations. Four installation types were identified - integral (replaces roofing), direct (mounted on top of roofing), stand-off (mounted away from roofing), and rack (for flat or low slope roofs, or ground mounted). Installation costs were developed for these mounting types as a function of panel/module size. cost drivers were identified. Studies were performed to identify optimum module shapes and sizes and operating voltage cost drivers. The general conclusion is that there are no perceived major obstacles to the use of photovoltaic modules in residential arrays. However, there is no applicable building code category for residential photovolttaic modules and arrays

and early additional work is needed with standards writing organizations to develop residential module and array requirements. (ERA citation 05:013306)

DOE/JPL/955266-1 PC **A03/MF A01**
Sensor Technology, Inc., Chatsworth, CA.
Automated Array Assembly Task: In-Depth Study of Silicon Wafer Surface Texturizing. Quarterly Technical Report No. 1, December 14, 1978-March 31, 1979.
G. T. Jones, S. Chitre, S. S. Rhee, and K. L. Allison. Mar 79, 49p
Contract NAS-7-100-955266

Four tasks were investigated in this program. Identification of Freon recycling as a low-cost wafer cleaning method was made. An ultrasonic vapor degreaser that utilizes the Freon recycling technique was ordered. Equipment was acquired to produce clean dry air. It was concluded that the low cost clean dry air system can replace the high cost dry nitrogen system without any adverse effects in the solar cell electrical performance. The texturizing process time in large scale production was found to be variable when chemical concentrations and temperatures in the two stage texturizing process were held constant. The introduction of a low temperature intermediate gettering step in combination with a two stage texturizing process sequence was shown to produce a large improvement in solar cell efficiencies. Gettering improved the quality of silicon wafer material. Experimental results also showed that gettering improved the electrical performance of spray-on doped solar cells. Sensor Technology's standard production process utilizing the gettering treatment produced an average batch efficiency of 13.3%. The highest solar cell efficiency obtained from this batch was 14.3%. (ERA citation 05:013271)

DOE/JPL/955269-1 PC **A02/MF A01**
Energy Materials Corp., Harvard, MA.
Low-Cost Solar Array Project: Task I, Silicon Material. Gaseous Melt Replenishment System. First Quarterly Progress Report, 17 April-17 July 1979.
D. N. Jewett, H. E. Bates, and D. M. Hill. 1979, 25p
Contract NAS-7-100-955269

This program was initiated in April of this year to develop a system to combine silicon formation, by hydrogen reduction of trichlorosilane, with the capability to replenish a crystal growth system. The silicon formation system is based on a resistance heated quartz reaction vessel in which reduction of trichlorosilane deposits silicon on the walls of the vessel. After sufficient deposition has occurred, the silicon will be melted out of the reaction vessel and carried to the crystal growth system by a heated quartz delivery tube. Isolation of the reaction vessel during the silicon formation stage will be accomplished by a quartz U-tube trap-type valve containing silicon which can be melted to allow passage of molten silicon, or solidified to prevent passage of reactant gases. During the quarterly reporting period, a variety of process parameters were estimated to allow sizing and specification of gas handling system components. Most of the major components of the system have been designed, or specified, and ordered. (ERA citation 05:009800)

DOE/JPL/955270-2 PC **A02/MF A01**
Kayex Corp., Rochester, NY.
Low Cost Czochralski Crystal Growing Technology. Near Term Implementation of the Flat Plate Photovoltaic Cost Reduction of the Low Cost Solar Array Project. Second Quarterly Progress Report, July 1-September 30, 1979.
E. G. Roberts. 1979, 13p
Contract NAS-7-100-955270

During the quarterly reporting period, the R.F. induction heating generator and the contractor-owned CG2000 RC crystal puller have been received and are currently being installed. Installation is approximately 90% complete. Completion is scheduled for October 3, 1979. All functions of the crystal grower have been tested out and a 7 kilogram crystal has been pulled in the equipment testing department as part of a standard customer acceptance analysis. Total redesign of the crystal recharge system has been completed and the fabrication has been subcontracted. Problems interfacing the R.F. work coil with the R.F. feed-thru system has necessitated a redesign of the coil connection assembly. This is scheduled for completion October 10, 1979. The R.F. feed-thru has been redesigned due to extensive lead times for specialized materials. The system is currently being fabricated in-house. The redesign now allows us to utilize the spectator viewport for the feed-thru rather than having to machine the port in the tank cover assembly. All necessary piece parts for crystal growth have been received, together with 159 kilograms of nominally 5" diameter polycrystalline silicon rod. A quotation has been received for fabrication of the cold crucible assembly and work coil. This is currently being evaluated. (ERA citation 05:013272)

DOE/JPL/955282-1 PC **A02/MF A01**
Siltec Corp., Menlo Park, CA.
LSA Large Area Silicon Sheet Task Enhanced ID Slicing Technology for Silicon Ingots. Quarterly Report, February-March 1979.
D. Walters. Apr 79, 21p
Contract NAS-7-100-955282

Efforts to make ingot technology cost effective for the production of low cost solar cells in the 1980-1986 timeframe have been divided into both the development of a continuous CZ growth process and advanced ingot slicing. While continuous CZ growth is being extensively explored with very promising results, very little work has been directed towards technological improvements of I.D. slicing - the primary shortcoming of ingot technology. The direction of this program is aimed towards the development and demonstratin of enhanced I.D. slicing technology that will significantly increase the number of useable slices per inch of crystal over industry practice. This method will require a reduction of both blade and slice thickness. It will be accomplished by a combination of three key elements of slicing technology: ingot rotation with minimum exposed blade area, dynamic cutting edge control, and the use of prefabricated insert blades. During the first quarter, design modifications were initiated on a Siltec slicing saw, Model E-1, with microprocessor controls. Hardware, to complete this conversion, is being fabricated. Several runs were conducted on the engineering saw incorporating the method of ingot rotation. Ingots with diameters up to 6 inches were sliced successfully on a production saw. (ERA citation 05:013273)

DOE/JPL/955282-79/2 PC **A03/MF A01**
Siltec Corp., Menlo Park, CA.
LSA Large Area Silicon Sheet Task Enhanced I.D. Slicing Technology for Silicon Ingots. Quarterly Report No. 2, April-June 1979.
D. Walters. Jul 79, 26p
Contract NAS-7-100-955282

Efforts to make ingot technology cost effective for the production of low cost solar cells in the 1980 to 1986 timeframe have been divided into both the development of a continuous CZ growth process and advanced ingot slicing. The direction of this program is aimed towards the development and demonstration of enhanced I.D. slicing technology that will significantly increase the number of usable slices per inch of crystal over industry practice. This method will require a reduction of both blade and slice thickness. It will be accomplished by a combination of three key elements of slicing technology: ingot rotation with minimum exposed blade area, dynamic cutting edge control, and the use of prefabricated insert blades. The development of cutting ingots with ingot rotation requires several design modifications of a Siltec slicing saw, Model E-1, with microprocessor controls. All necessary design changes under the plan are completed, and the fabrication of hardware has begun. A demonstration of ingot cutting with rotation was performed. Wafers produced were 10 cm in diameter, 250 mu thick with a standard kerf of 250 and 305 mu . Difficulties with decreasing kerfs were encountered. A conceptual design of cutting edge control devices, supported by experimental data, was completed. A number of cutting inserts with various parameter variations are presently manufactured. Bonding tests for core and insert materials in static and dynamic conditions are performed. (ERA citation 05:013274)

DOE/JPL/955287-3 PC **A03/MF A01**
Kulicke and Soffa Industries, Inc., Horsham, PA.
Automated Solar Module Assembly Line. Quarterly Technical Report No. 3.
M. Bycer. Sep 79, 32p
Contract NAS-7-100-955287

Progress during this period includes the work performed in bonding interconnects with induction and pulsed heating, and prototype designs for the conveyor, theta orient station, and vacuum pick-up and lance assemblies. The machine which Kulicke and Soffa is to deliver under this contract is a cell stringing and string applique machine which will be flexible in design, capable of handling a variety of cells and assembling strings of cells which can then be placed in a matrix up to 2' 4' in series or parallel arrangement. The target machine cycle is to be 5 seconds per cell. This machine will be preimarily adapted to 3 inch diameter round cells with one or two tabs between cells. The design of the machine will be flexible so that it can be modified to handle other cell sizes, string lengths and module arrangements. The solar cells to be delivered for performance tests on the equipment to be delivered are 3 inch diameter commercially available cells of high quality. The bonding interconnect technique to be utilized is pulsed heat technology. (ERA citation 05:013275)

DOE/JPL/955298-1 PC **A02/MF A01**
Spectrolab, Inc., Sylmar, CA.
High Resolution, Low Cost Solar Cell Contact Development. Quarterly Technical Progress and Schedule Report, Quarter Ending August 24, 1979.
N. Mardesich. 21 Sep 79, 21p
Contract NAS-7-100-955298

Experimental work to demonstrate the feasibility of the MIDFILM process as a means of applying solar cell collector metallization has been conducted during this quarter. The MIDFILM process attains a line resolution characteristic comparable to photoresist methods with a process related to screen printing. The surface to be processed is first coated with a thin layer of photoresist material. Upon exposure to ultraviolet light through a suitable mask, the resist in the non-pattern area crosslinks and becomes hard. The unexposed pattern areas remain tacky. The conductor material is applied in the form of a dry mixture of metal and frit particles which adhere to the tacky pattern area. The assemblage is then fired to ash the photopolymer and sinter the fritted conductor powder. Five silver powder conproduced comparable performance to screen printed paste, which was used as a control. (ERA citation 05:013276)

DOE/JPL/955307-2 PC **A03/MF A01**
Solarex Corp., Rockville, MD.
Analysis of the Effects of Impurities in Silicon. Second Quarterly Report, May 1-July 31, 1979.
J. H. Wohlgemuth, W. M. Lafky, and J. H. Burkholder. 1979, 44p
Contract NAS-7-100-955307

The purpose of this program is to conduct a solar cell fabrication and analysis program to determine the effects on the resultant solar cell efficiency of impurities intentionally incorporated into silicon. The program will employ flight-quality technologies and quality assurance to assure that variations in cell performance are due to the impurities incorporated in the silicon. Efforts included (1) completion of the processing of verification cells to assure proper process control and to serve as a data base for all future experimental work, (2) study of the dependance of cell performance on crystal orientation to aid in evaluation of the 111 test wafers and (3) completion of the first 5 test runs and analysis of their performance. The verification runs resulted in an average AMO cell efficiency of 12.9% at 25 exp 0 C (in excess of 15% AMI at 25 exp 0 C). The average test lot efficiency has varied from 10.6 to 12% at AMO and 25 exp 0 C. The first 5 test lots have shown a large variation in bulk resistivity (0.2 omega -cm up to 3.8 omega -cm) resulting in large variations in lot open circuit voltage (561 mV to 610mV) as would be expected for doping with any active species. The presence of grains boundaries in several wafers had no effect on cell electrical performance. All monitor and control runs to date have cell performance characteristics indistinguishable from the verification runs indicating no contamination. The type and level of impurity doping in each test lot is given and the

mechanism responsible for the degradation of cell performance has been identified and correlated to the doped impurities. (ERA citation 05:013277)

DOE/NASA/20485-79/6 PC **A02**/MF **A01**
National Aeronautics and Space Administration, Cleveland, OH. Lewis Research Center.
Global Calibration of Terrestrial Reference Cells and Errors Involved in Using Different Irradiance Monitoring Techniques.
H. B. Curtis. 1979, 13p NASA-TM-81393, CONF-800106-5
Contract EX-76-A-29-1022
14. photovoltaics specialists conference, San Diego, CA, USA, 7 Jan 1980.

Experiments have shown that global calibration of terrestrial reference cells is feasible provided reasonable constraints on irradiance and incident sun angle are used. There is significantly less dependence of the calibration value on atmospheric composition in the global method compared to the collimated technique. A simple, accurate secondary calibration technique based on ratios of test to reference cell currents measured in natural sunlight was developed. Studies and experiments have been performed to determine relative merits and errors involved in using different techniques for monitoring incident irradiance during solar cell performance measurements. The techniques of black-body detectors, calibrated reference cells, and the convolution of spectral response with solar irradiance are considered. The second is the most accurate technique. (ERA citation 05:009783)

DOE/NASA/5906-79/1 PC **A06**/MF **A01**
Technical Report Services, Rocky River, OH.
Evaluation of Feasibility of Prestressed Concrete for Use in Wind Turbine Blades.
S. Lieblein, D. S. Londahl, D. B. Furlong, D. J. Peery, and M. E. Dreier. Sep 79, 120p NASA-CR-159725
Contract EX-76-A-29-1028

As a part of the DOE/NASA research program on wind energy, a preliminary evaluation was conducted of the feasibility of the use of prestressed concrete as a material for low-cost blades for wind turbines. A baseline blade design was achieved for the DOE/NASA MOD-O 100 kW experimental wind turbine that met aerodynamic and structural requirements. Calculated blade weight and cost were 4900 lb and around $18,000, compared to 2000 lb and around $200,000 for a MOD-O aluminum blade. Significant cost reductions were indicated for volume production. Casting of a model blade section showed no fabrication problems. Coupled dynamic analysis revealed that adverse rotor-tower interactions can be significant with heavy rotor blades. Design options are discussed. Areas of further investigation are identified to verify the design approach and to provide the property data base required for concrete blade design. (ERA citation 05:013453)

DOE/TIC-10227 PC **A09**/MF **A01**
Kaman Sciences Corp., Colorado Springs, CO.
Wind Powered Heat Pump in a Dairy Farm Application. Final Report.
G. B. Curtis. 16 Oct 78, 177p

A 30-foot high and 20-foot diameter Darrieus wind turbine was installed on a 120-cow dairy farm. The wind turbine generated 3-phase electrical power which was used, in parallel with utility power, to operate the refrigeration equipment for milk cooling at the dairy farm. A milk precooler and heat recovery from the refrigeration condenser were also installed to supply the warm water requirements of the dairy. The system was operated for 183 days and its performance, along with wind measurements for the same period, was analyzed to yield predictions for the size of wind turbine required to supply needed energy and the size of ice storage unit needed to store refrigeration capacity over periods of low wind. (ERA citation 05:011817)

DSE-23047-T1 PC **A03**/MF **A01**
Exxon Research and Engineering Co., Linden, NJ.
Thin Film Polycrystalline Silicon Solar Cells. Quarterly Report No. 1, January 1, 1979-March 31, 1979.
A. K. Ghosh, T. Feng, H. P. Maruska, and C. Fishman. 1979, 47p
Contract AC02-79ET23047

A theory capable of predicting the performance of polycrystalline silicon solar cells is formulated. It relates grain size to mobility, lifetime, diffusion length, reverse saturation current, open circuit photovoltage and fill factor. Only the diffusion lengths measured by the surface photovoltage technique for grains less than or equal to 5 mu m do not agree with our theory. The reason for this discrepancy is presently being investigated. We conclude that grains greater than or equal to 100 mu m are necessary to achieve efficiencies greater than or equal to 10 percent at AM1 irradiance. The calculations were performed for the case of no grain boundary passivation. At present we are investigating the improvements to be expected from grain boundary passivation. We have determined that the parameters that best fit the available data are as follows: (1) Number of surface states at grain boundaries acting as recombination centers - 1.6 x 10 exp 13 /cm exp 2 . (2) Capture cross section - 2 x 10 exp -16 cm exp 2 . (3) Surface recombination velocity at grain boundary - 3.2 x 10 exp 4 cm/sec. The following types of solar cells are considered in the model: SnO sub 2 /Si Heterostructure, MIS, and p/n junction. In all types of solar cells considered, grain boundary recombination plays a dominant role, especially for small grains. Though the calculations were originally expected to yield only order of magnitude results, they have proven to be accurate for most parameters within 10 percent. (ERA citation 05:013283)

DSE-2554-78/2(V.2) PC **A18**/MF **A01**
Dayton Univ., OH. Research Inst.
Analysis of the Madaras Rotor Power Plant: An Alternate Method for Extracting Large Amounts of Power from the Wind. Volume 2. Technical Report.
D. H. Whitford, J. E. Minardi, B. S. West, and R. J. Dominic. Jun 78, 423p
Contract EX-76-S-01-2554

The purpose of the program was to analyze and up-date the design of the Madaras Rotor Power Plant concept that had been developed in the 1930's to determine the technical and economic feasibility of this system to be competitive with conventional horizontal axis wind turbines. A four-task program consisting of a series of wind tunnel tests, an electro-mechanical analysis, a performance analysis, and a cost analysis was conducted. (ERA citation 05:011826)

DSE-3412-T2 PC **A02**/MF **A01**
Hughes Aircraft Co., Malibu, CA.
Photovoltaic Mechanisms in Polycrystalline Thin-Film Solar Cells. Quarterly Technical Progress Report No. 2, January 27-April 27, 1979.
K. Zanio. Aug 79, 16p
Contract ET-78-C-01-3412

Indium phosphide films were prepared at reduced temperatures on InP by the planar reactive deposition technique. For substrate temperatures as low as 260 exp 0 C and growth rates of 1 mu m/h, single-crystal epitaxy was obtained on (100) semi-insulating substrates. These results are preliminary steps in the process of achieving clean polycrystalline layers and preparing p-n junctions containing grain boundaries. In parallel studies to eventually passivate grain boundaries by etching beyond the p-n junction to form isolated single-crystal mesa structures, a 3 HNO sub 3 :HCl etch was found to preferentially attack selected InP grain boundaries and produce grooves. (ERA citation 05:013280)

DSE-4042-T14 PC **A02**/MF **A01**
Boeing Aerospace Co., Seattle, WA.
Cadmium Sulfide/Copper Ternary Heterojunction Cell Research. Second Quarterly Technical Progress Report, June 1-August 31, 1979.
R. A. Mickelsen, W. S. Chen, P. S. P. Wei, and L. F. Buidhaupt. Oct 79, 24p
Contract EG-77-C-01-4042

The preparation of CuInSe sub 2 thin films by simultaneous elemental evaporation is reported to be more reproducible with the application of Electron Impact Emission Spectroscopy (EIES) for deposition rate control. Rapid diffusion processes occurring at the high substrate temperatures are described as precluding the use of thick selenide layers highly deficient in In as part of the cell structure. Growth of cell degrading copper nodules in low resistivity, P-type CuInSe sub 2 films exposed to CdS is discussed. A point defect model for the vacuum deposited CuInSe sub 2 cells is discussed and demonstrate the repeatable achievement of 2 to 5% efficient cells. These cells are described as possessing high photocurrents (25-34mA/cm exp 2) and low open circuit voltages (150-310mV) when tested under simulated AM-1 conditions. Detailed analysis of cells as a function of temperature and lighting conditions is described. The cell measurements are reported to be in good agreement with a cell model and indicate that the low voltage is caused by a high resistivity selenide layer at the junction. (ERA citation 05:013282)

DSE-4042-T5 PC **A03**/MF **A01**
TELIC Corp., Santa Monica, CA.
Cadmium Sulfide/Copper Sulfide Heterojunction Cell Research. Quarterly Technical Progress Report, February 26-May 31, 1979.
J. A. Thornton. 31 Jul 79, 35p
Contract EG-77-C-01-4042

All-vacuum sputter deposited heterojunction solar cells of the CdS/Cu sub 2 S and Cd/sub 1-x/Zn/sub x/S/Cu sub 2 S types have been fabricated on glass substrates by dc reactive sputtering using cylindrical-post magnetron sputtering sources and Ar-H sub 2 S working gases. The rear electrode is Nb. The top grid electrode is Au sputter deposited through a mechanical mask. Preliminary measurements on nonoptimized cells have yielded efficiencies of about 0.4% with short circuit currents of about 3 mA/cm exp 2 , open circuit voltages of about 0.35V and fill factors of about 0.37. Extensive modifications are being made to the deposition apparatus which will permit greater control over the process variables and optimization of the cells. A series of experiments are reported which indicated that at the high deposition temperatures used for the Cd(Zn)S deposition (approx. 300 exp 0 C), an electrically active impurity, capable of influencing both the series resistance and the junction behavior of the cells, may pass from the Nb into the Cd(Zn)S. (ERA citation 05:013281)

EPRI-EA-630 PC **A05**/MF **A01**
New Mexico Univ., Albuquerque. Dept. of Economics.
Economic Modeling of Electricity Production from Hot Dry Rock Geothermal Reservoirs: Methodology and Analyses. Final Report.
R. G. Cummings, and G. E. Morris. Sep 79, 90p
LA-7888-HDR
Contract W-7405-ENG-36

An analytical methodology is developed for assessing alternative modes of generating electricity from hot dry rock (HDR) geothermal energy sources. The methodology is used in sensitivity analyses to explore relative system economics. The methodology used a computerized, intertemporal optimization model to determine the profit-maximizing design and management of a unified HDR electric power plant with a given set of geologic, engineering, and financial conditions. By iterating this model on price, a levelized busbar cost of electricity is established. By varying the conditions of development, the sensitivity of both optimal management and busbar cost to these conditions are explored. A plausible set of reference case parameters is established at the outset of the sensitivity analyses. This reference case links a multiple-fracture reservoir system to an organic, binary-fluid conversion cycle. A levelized busbar cost of 43.2 mills/kWh ($1978) was determined for the reference case, which had an assumed geothermal gradient of 40 exp 0 C/km, a design well-flow rate of 75 kg/s, an effective heat transfer area per pair of wells of 1.7 x 10 exp 6 m exp 2 , and plant design temperature of 160 exp 0 C. Variations in the presumed geothermal gradient, size of the reservoir, drilling costs, real rates of return, and other system parameters yield minimum busbar costs between -40% and +76% of the reference case busbar cost. (ERA citation 05:011762)

EPRI-FP-1226 PC **A06**/MF **A01**
KVB, Inc., Tustin, CA.
Pulverizer Failure Cause Analysis. Final Report.
K. L. Maloney, and R. C. Benson. Dec 79, 121p

Large coal pulverizers have been identified by EEI surveys as one of the main systems responsible

for lost steam generation capacity of large coal fired utility boilers. This report contains the results of a 16 month study to examine the problem of pulverizer outages and to identify root cause failure modes for the major mill types currently in service. A data base of 469 pulverizers, the majority larger than 40 tons/hr coal capacity, was compiled by surveying the utilities with coal fired boilers in this country. The analysis of this data base combined with telephone interviews and seven field site visits to utilities identified both design and operational problem areas in all of the mill types studied. Five specific problem areas were established and evaluated in this study: (1) drive components, (2) grinding zone, (3) air system, (4) mill fires and explosions, and (5) boiler problems associated with the pulverizer. The root causes of these problems were identified and documented. Recommendations for solutions to some of the more common problems were given after discussion of the findings with the manufactuers. (ERA citation 05:013021)

EPRI-WS-78-134 PC **A13**/MF **A01**
Science Applications, Inc., Palo Alto, CA.
Plant Performance Testing and Evaluation Workshop. Workshop Proceedings.
N. Bloom, and E. T. Burns. Nov 79, 291p

Eighteen papers were presented at the meeting. A separate abstract was prepared for each paper. (ERA citation 05:013491)

FE-1760-37 PC **A03**/MF **A01**
Tennessee Univ. Space Inst., Tullahoma.
MHD Coal-Fired Flow Facility. Quarterly Technical Progress Report, January-March 1979.
J. B. Dicks, H. P. Markant, and L. W. Crawford.
21 Mar 79, 45p
Contract EX-76-C-01-1760

The overall objective is to advance the technology of direct coal-fired MHD components and systems required for MHD power systems operating under engineering simulation of central power station power conditions. The specific objectives of the UTSI R and D MHD Facility and the MHD Coal-Fired Flow Facility are to resolve experimentally and analytically the key technical problems which have been identified or which may be found to occur in direct coal-fired MHD systems with moderate to high ash carryover. The problem areas involve (1) combustor performance, (2) slag/seed separation, (3) seed separation efficiency from both the exhaust gas stream and from slag, (4) MHD generator performance and design requirements using slag deposition on the channel walls to protect these walls from the intense thermal environment, (5) effects of slag on freedom from serious plugging by solid or high-viscosity slag particles during normal operation, (6) response of candidate materials to direct coal-fired MHD environment, and (7) equipment to meet pollution requirements. Status of the program is reported. (ERA citation 05:012058)

FE-1806-48 PC **A09**/MF **A01**
General Electric Co., Schenectady, NY. Gas Turbine Div.
Development of High-Temperature Turbine Subsystem Technology to a "Technology Readiness Status". Phase II. Quarterly Report, April-June 1978.
Jul 78, 185p
Contract EX-76-C-01-1806

The objective of the High-Temperature Turbine Technology (DOE-HTTT) program is to bring to technology readiness, over a six- to ten-year duration, a high-temperature turbine for use in a combined cycle, using coal-derived fuel at a firing temperature of 2600 exp 0 F with growth capability to 3000 exp 0 F. Phase I, Program and System Definition, was completed and progress in Phase II, Technology Testing and Test Support Studies, is reported. The objectives of Phase II are to: perform component design and technology testing in critical areas; perform system design and trade-off analyses in sufficient depth to support the component design and test tasks; and update the Phase I combined cycle studies to evaluate the commercial viability of a GE-TRV turbine system. Information is included on hot gas path development test facilities, turbine simulator tests, shock tunnel test, low-temperature, low-BTU gas cleanup system, motorized rig tests, air turbine tests, liquid- and gas-fueled combined-cycle power plants, turbine subsystem design, update of verification test system definition (GE-TRV), and technology readiness vehicle (GE-TRV) design. (ERA citation 05:011835)

FE-2357-41 PC **A03**/MF **A01**
General Electric Co., Schenectady, NY. Energy Systems Programs Dept.
PFB Coal Fired Combined Cycle Development Report. Design Evaluation Report.
Dec 78, 31p
Contract EX-76-C-01-2357

The design review team addressed four major questions: the logic and structure of the design approach; the adequacy and completeness of the preliminary design as the basis for the next step definitive design of a pilot plant; the soundness of the performance projections; and the appropriateness of the risk assessment. The reviewers concluded that the approach is sound and the logic and structure reflect appropriate design disciplines for this stage of the project, the disciplines reflect General Electric practice for complex development projects, and comments by external reviewers suggest these disciplines are not standard in other companies; the preliminary design is a sound basis for the next step provided that the required technology tests confirm the design assumptions. (Most of the required tests are planned, but some areas require additional confirmation); and performance projections at steady-state full load are basically sound and require only minor refinements. Performance projections at part load and under transient conditions require additional effort to provide adequate definition, and no barrier problems are anticipated, but minor design changes could enhance plant load response characteristics. The review team basically agreed with the risk assessment of the design team on the reference plant approach, although this represents a consensus of a broad spectrum of individual opinions on many questions. The review team did point out several areas where additional parallel efforts might improve the design or lessen the risk involved in the reference approach.They specifically expressed concern that some promising technology developments were being discarded prematurely. (ERA citation 05:013502)

FE-2363-4 PC **A15**/MF **A01**
Westinghouse Electric Corp., Pittsburgh, PA. Advanced Energy Systems Div.
MHD ETF-150 MW Progressive Facility Reference Concept.
Aug 79, 335p
Contract EF-77-C-01-2363

The objectives of this study were to develop a progressive program plan for a 150 MWt MHD engineering test facility. The facility was to start with a minimal MHD power train system which utilized a proven separately fired air preheater with oxygen enhancement as needed. It was to be capable of progressive evolvement into a final configuration which included all of the pertinent systems necessary to demonstrate the open cycle MHD combined cycle plant in a 150 MWt size. Cost, risk, schedule, performance effects and component usefulness in various phases of the progressive plan were to be evaluated. The previous 150 MWt Reference ETF Design Study results were to be utilized as a starting point for this study. Inasmuch as possible, current state-of-the-art components were to be used (as long as they did not compromise the performance or limit the ability to determine the potential of the MHD system). Direct or indirect preheat options were to be available in the final configuration. The flexibility to accommodate changes in components, substitute equipment and allow for uncertainties existing in developing equipments was to be provided. No steam driven generator was to be included although the required steam conditions necessary for such a bottoming plant were to be demonstrated. The system should in its final configuration utilize coal as its energy source, although oil or gas could be maintained as options for the separately fired air preheater combustor. The results of this study are to provide guidance for and recommend the most logical plan by which the maximum information from plant design demonstration and operating performance could be obtained. Assessment of the various arrangements of the components and systems configurations is to provide guidance for the definition of priority development efforts needed for design and construction of the ETF. (ERA citation 05:012059)

FE-2688-T1 PC **A04**/MF **A01**
Ternion, Inc., Denver, CO.
Investigation into the Commercial Application of First Generation MHD Power Plants to the Aluminum Industry.
M. T. Dooley, and L. D. Carter. Oct 78, 51p
Contract ET-78-C-01-2688

The United States has embarked on an ambitious program to develop open-cycle, coal-fired MHD-topped steam power generation plants to commercialization by the end of this century. The results of a study on the commercial application of the first generation MHD power plants to the aluminum industry are reported. The basic processes and energy requirements of the aluminium industry are reviewed, and the operation of coal-fired combined-cycle MHD power plants is described. Dual-purpose MHD power plants are considered. (ERA citation 05:012060)

IKE-K-54-10 PC **A04**/MF **A01**
Stuttgart Univ. (Germany, F.R.). Inst. fuer Kernenergetik und Energiesysteme.
Determination of the Reserve Capacity of a Power Plant Park, Using the Example of Baden-Wuerttemberg.
N. Zuefle, and H. Weible. Jul 79, 73p
In German.
U.S. Sales Only.

Reserve capacity is absolutely necessary for a reliable power system. Spare capacity is required in order to compensate for intended or unintended power losses. The margin of safety and the necessary reserve capacity was determined for the power plants of the public power supply utilities in Baden-Wuerttemberg from 1960 to 1977 using an available computer program. Input data included power levels and failure-related outages of the power plants as well as the net import-rates and the maximum load. The safety margin designated could be achieved except for the years 1960 to 1963, 1965 and 1966. Since 1971 a nearly constant margin of safety of 1 was reached. It is emphasized that the dates for the net surplus of important underlay the actually used power and not the power saved by means of contracts. Further studies were performed in order to examine different methods of calculations, various configurations of power supply parks, variations of non-availabilities and the influence of the net import surplus. (ERA citation 05:010036)

LBL-10243 PC **A02**/MF **A01**
California Univ., Berkeley. Lawrence Berkeley Lab.
Measurement and Analysis of Circumsolar Radiation.
D. F. Grether, D. Evans, A. Hunt, and M. Wahlig. Oct 79, 11p
Contract W-7405-ENG-48

Four instrument systems called Circumsolar Telescopes are used to measure the solar and circumsolar radiation for application to solar energy systems that employ lenses or mirrors to concentrate the incident sunlight. circumsolar radiation results from the scattering of direct sunlight through small angles by atmospheric aerosols (dust, water droplets or ice crystals in thin clouds, etc.). The solar energy system will typically collect all of the direct solar radiation (that originating from the disk of the sun) plus some fraction of the circumsolar radiation. The exact fraction depends upon many factors, but primarily upon the angular size (field-of-view) of the receiver. A knowledge of the circumsolar radiation can be used as a factor in the optimization of a receiver design, as one measure of the suitability of a geographic region for concentrating systems, or as input to comparison studies of competing designs at a particular location. Each measuring system has a scanning telescope mounted on a precision solar tracker. The telescope is mechanically scanned thru an arc of 6 exp 0 with the sun at the center of the arc. A digitization of the brightness of the sun or circumsolar radiation is taken every 1.5' of arc, with a complete scan taking one minute of time. Auxiliary instruments include a pyrheliometer and two pyrano-

meters, one mounted in the usual horizontal position and one tracking the sun. The telescope and pyrheliometer have batched ten position filter wheels: one open position, eight interference filters that divide the solar spectrum into eight intervals of roughly equal energy content, and one opaque filter to monitor detector noise. The data are recorded on magnetic tape, with one tape holding one week's worth of data per telescope. The tapes are shipped to LBL for computer processing. (ERA citation 05:013233)

LBL-9565 PC **A11**/MF **A01**
California Univ., Berkeley. Lawrence Berkeley Lab.
Flow-Through Porous Electrodes.
J. A. Trainham, III. Aug 79, 242p
Contract W-7405-ENG-48
Thesis.

The analysis and behavior of flow-through porous electrodes operating above and below the limiting current are the subjects of this dissertation. First, the minimum concentration attainable in a flow-through porous electrode is estimated by applying the thermodynamics of electrochemical cells with a knowledge of the maximum operating potential. Second, a one-dimensional model for flow-through porous electrodes operating above and below the limiting current of a metal deposition reaction is developed. Third, preliminary data on mercury removal from a sodium chloride brine using a flow-through porous carbon electrode show that this process has great potential. The mercury concentration was reduced from approximately 600 mg/1 in the feed to less than 0.1 mg/1 in the dilute product stream. Finally, an economic comparison is made between two electrode configurations for flow redox battery applications: (i) the flow-through configuration (current parallel to the fluid flow) and (ii) the flow-by configuration (current perpendicular to the fluid flow). Optimization results show that the flow-by configuration is superior. The flow-through configuration not only yields a lower return on investment, but it is impractical due to a requirement of extremely low flow rates (Re $<$ 0.001). Its failure is due to current flow (and ohmic potential drop) in the same direction as the fluid flow. (ERA citation 05:013989)

NASA-CP-2106 PC **A20**/MF **A01**
National Aeronautics and Space Administration, Cleveland, OH. Lewis Research Center.
Large Wind Turbine Design Characteristics and R and D Requirements.
S. Lieblein. 1979, 464p CONF-7904111-
Conference on large wind turbine characteristics and R and D requirements, Cleveland, OH, USA, 24 Apr 1979.

Separate abstracts are included for each of the 29 papers presented concerning the development states of large wind turbines, and wind turbine blade design characteristics and operating experience. (ERA citation 05:013454)

N80-20306/0 PC **A06**/MF **A01**
United Technologies Corp., South Windsor, CT.
Lightweight Fuel Cell Powerplant Components Program.
Final Report, 18 Mar. 1974 - 31 Dec. 1979.
R. E. Martin. 22 Feb 80, 103p NASA-CR-161412, FCR-1656
Contract NAS8-30637

A lightweight hydrogen-oxygen alkaline fuel cell incorporated into the design of a lightweight fuel cell powerplant (LFCP) was analytically and experimentally developed. The powerplant operates with passive water removal which contributes to a lower system weight and extended operating life. A preliminary LFCP specification and design table were developed along with a lightweight power section for the LFCP design, consisting of repeating two-cell modules was designed. Two, four-cell modules were designed incorporating 0.508 sq ft active area space shuttle technology fuel cells. Over 1,200 hours of single-cell and over 8,800 hours of two-cell module testing was completed. The 0.25 sq ft active area lightweight cell design was shown to be capable of operating on propellant purity reactants out to a current density of 600ASF. Endurance testing of the two-cell module configuration exceeded the 2,500-hour LFCP voltage requirements out to 3700-hours. A two-cell module capable of operating at increased reactant pressure completed 1000 hours of operation at a 30 psia reactant pressure. A lightweight power section consisting of fifteen, two-cell modules connected electrically in series was fabricated.

N80-20812/7 PC **A04**/MF **A01**
Motorola, Inc., Phoenix, AZ.
Market Definition Study of Photovoltaic Power for Remote Villages in the United States.
C. Ragsdale, and P. Quashie. Feb 80, 71p
NASA-CR-159800, DOE/NASA/0049-80/1
Contracts DEN3-49, DE-AI01-79ET-20485

A grass roots evaluation of the market potential was carried out for photovoltaic applications in remote villages in the U. S. and its possessions. An estimate of almost 14 MWp available for conversion from a potential to a real market was defined. The total power potential was based on the energy needs of almost 400 sites reported by Federal agencies and inputs from over 100 Indian tribes. The methodology used, the results achieved, and some recommendations of how to convert this domestic market potential into a real market are detailed.

N80-20815/0 PC **A03**/MF **A01**
Optical Coating Lab., Inc., City of Industry, CA. Photoelectronics Div.
Development of Low Cost Contacts to Silicon Solar Cells.
Quarterly Report, 15 Oct. 1979 - 15 Jan. 1980.
D. P. Tanner. Jan 80, 31p NASA-CR-162905, DOE/JPL-955244-80/4
Contract JPL-955244
Prepared for JPL and DOE.

The results of the second phase of the program of developing low cost contacts to silicon solar cells using copper are presented. Phase 1 yielded the development of a plated Pd-Cr-Cu contact system. This process produced cells with shunting problems when they were heated to 400 C for 5 minutes. Means of stopping the identified copper diffusion which caused the shunting were investigated. A contact heat treatment study was conducted with Pd-Ag, Ci-Ag, Pd-Cu, Cu-Cr, and Ci-Ni-Cu. Nickel is shown to be an effective diffusion barrier to copper.

N80-20816/8 PC **A04**/MF **A01**
Mobil Tyco Solar Energy Corp., Waltham, MA.
Large Area Silicon Sheet by Efg.
Annual Progress Report, 1 Oct. 1978 - 30 Sep. 1979.
14 Mar 80, 74p NASA-CR-162907, JPL-9950-313
Contract JPL-954355
Sponsored in Part by DOE.

Recent advances toward silicon growth stations and improved electronic quality of multiplesilicon are discussed. These advances were made in large measure by studies in which the composition of the gas environment around the meniscus area was varied. By introducing gases such as CO2, CO, and CH4 into this region, reproducible increases in diffusion length and cell performance were realized, with the best large area (5 cm x 10 cm) cells exceeding 11% efficiency.

N80-20817/6 PC **A03**/MF **A01**
Sensor Technology, Inc., Chatsworth, CA.
Phase 2: Array Automated Assembly Task Low Cost Silicon Solar Array Project.
Quarterly Technical Report, Oct. - Dec. 1979.
G. T. Jones. Dec 79, 39p NASA-CR-162912, JPL-9950-316
Contract JPL-954865
Prepared for JPL and DOE.

Several microwave systems for use in solar cell fabrication were developed and experimentally tested. The first system used a standing wave rectangular waveguide horn applicator. Satisfactory results were achieved with this system for impedance matching and wafer surface heating uniformity. The second system utilized a resonant TM sub 011 mode cylindrical cavity but could not be employed due to its poor energy coupling efficiency. The third and fourth microwave systems utilized a circular waveguide operating in the TM sub 01 and TM sub 11 but had problems with impedance matching, efficiency, and field uniformity.

N80-20819/2 PC **A06**/MF **A01**
MB Associates, San Ramon, CA.
Use of Glass Reinforced Concrete (Grcd) as a Substrate for Photovoltaic Modules.
Final Report.
J. L. Eirls. 12 Mar 80, 109p NASA-CR-162898, DOE/JPL-955281-80/4
Contracts NAS7-100, JPL 955281

A substrate for flat plate photovoltaic solar panel arrays using a glass fiber reinforced concrete (GRC) material was developed. The installed cost of this GRC panel is 30% less than the cost goal of the Near Term Low-Cost Flat Plate Photovoltaic Solar Array Program. The 4 ft by 8 ft panel is fabricated from readily available inexpensive materials, weighs a nominal 190 lbs., has exceptionally good strength and durability properties (rigid and resists weathering), is amenable to mass production and is easily installed on simple mountings. Solar cells are encapsulated in ethylene/vinyl acetate with Tedlar backing and Korad cover film. The laminates are attached to the GRC substrate with acrylic transfer tape and edge sealed with silicone RTV adhesive.

N80-20864/8 PC **A05**/MF **A01**
General Electric Co., Philadelphia, PA. Space Div.
Mod 1 Wind Turbine Generator Failure Modes and Effects Analysis.
Feb 79, 95p NASA-CR-159494, DOE/NASA/0058-79/1
Contracts NAS3-20058, EX-77-A-29-1010

A failure modes and effects analysis (FMEA) was directed primarily at identifying those critical failure modes that would be hazardous to life or would result in major damage to the system. Each subsystem was approached from the top down, and broken down to successive lower levels where it appeared that the criticality of the failure mode warranted more detail analysis. The results were reviewed by specialists from outside the Mod 1 program, and corrective action taken wherever recommended.

N80-20909/1 PC **A03**/MF **A01**
Paragon Pacific, Inc., El Segundo, CA.
Wind Energy System Time-Domain (West) Analyzers Using Hybrid Simulation Techniques.
Final Report.
J. A. Hoffman. Oct 79, 30p NASA-CR-159737, PPI-1030-6
Contract DEN3-26
Prepared for NASA and DOE.

Two stand-alone analyzers constructed for real time simulation of the complex dynamic characteristics of horizontal-axis wind energy systems are described. Mathematical models for an aeroelastic rotor, including nonlinear aerodynamic and elastic loads, are implemented with high speed digital and analog circuitry. Models for elastic supports, a power train, a control system, and a rotor gimbal system are also included. Limited correlation efforts show good comparisons between results produced by the analyzers and results produced by a large digital simulation. The digital simulation results correlate well with test data.

ORNL/MIT-290 PC **A02**/MF **A01**
Oak Ridge National Lab., TN.
Mass Transport in Molten-Salt Electrochemical Systems.
J. U. Nwalor, and A. R. Manner. 24 Mar 79, 25p
Contract W-7405-ENG-26

The early stages (0.1 mu s - 5 sec) of EMF relaxation of a Li sub 2 CO sub 3 /K sub 2 CO sub 3 electrolysis cell were studied with applied currents of 100 to 700 mA at 582 exp 0 C after electrolysis durations of 1 s, 1, 5, and 10 min, and 1 hr. The short-term EMF decay was delimited into five regimes: the IR drop (0 to 5 mu s), anodic double-layer decay (approx. 75 mu s), cathodic double-layer decay (approx. 5 ms), an unidentified decay (approx. 5 s), and a thermal gradient decay (approx. 2 min). Empirical expressions are given for the regimes. The unidentified regime suggests the presence of a gaseous-diffusion-controlled process. The isolation of the electrodes and their subsequent individual investigation is suggested for future study. The incorporation of the early phenomena into a theoretical migration-diffusion-model-based EMF expression is also recommended. Coordinate transformations are suggested for the optimization of the existing computer code which solves the model. (ERA citation 05:008767)

ORNL/TM-7014 PC A02/MF A01
Oak Ridge National Lab., TN.
Relaxation of Electrode Potential Difference, Temperature Gradient and Pressure Gradient in Electrolyzed Fuel Cell Tiles. Molten Carbonate Fuel Cell Program. Progress Report for Period April 1-June 30, 1979.
J. Braunstein, H. R. Bronstein, and D. H. Smith.
Dec 79, 15p
Contract W-7405-ENG-26

This report describes results obtained in the period April 1-June 30, 1979 on the analysis of relaxation of electrode potential differences, temperature gradients and pressure gradients induced by current flow in fuel cell tiles subjected to electrolysis. Progress has been made in resolving the magnitudes and time values of some of the processes contributing to the observed relaxations. Experiments have continued on the measurement of transference numbers in molten Li sub 2 CO sub 3 -K sub 2 CO sub 3 . (ERA citation 05:010236)

ORO-5135-77/1 PC A07/MF A01
West Virginia Univ., Morgantown. Dept. of Aerospace Engineering.
Innovative Wind Turbines. Circulation Controlled Vertical Axis Wind Turbine. Progress Report, March 1-December 31, 1976.
R. E. Walters, J. B. Fanucci, P. W. Hill, P. G. Migliore, and W. Squire. Oct 78, 140p
Contract EY-76-C-05-5135

Theoretical and experimental research efforts in evaluating an innovative concept for vertical axis wind turbines (VAWT) are described. The concept is that of using straight blades composed of circulation controlled airfoil sections. The theoretical analysis has been developed to determine the unsteady lift and moment characteristics of multiple-blade cross-flow wind turbines. To determine the drag data needed as input to the theoretical analysis, an outdoor test model VAWT has been constructed; design details, instrumentation, and calibration results are reported. Initial testing is with fixed pitch blades having cross-sections of conventional symmetrical airfoils. Costs of building the test model are included, as well as estimates for blades constructed with composite materials. These costs are compared with those of other types of wind turbines. (ERA citation 05:013479)

ORO-5669-T1 PC A05/MF A01
Temple Univ., Philadelphia, PA. Dept. of Chemistry.
Protonic Conduction Wave Energy Converter. Final Report, January 1-December 31, 1978.
R. E. Salomon. 1979, 80p
Contract ET-78-S-05-5669

An initial study of the feasibility of using electrochemical hydrogen concentration cells with protonic conductors for the conversion of ocean wave energy into electricity has been carried out. The system considered uses the potential energy of waves or ocean swells to alternately compress and expand hydrogen gas which thereby drives a concentration cell. A theoretical analysis of four idealized embodiments of the device, incorporated within a taut-moored buoy, has shown that the key to efficient conversion is sufficiently low electrode and electrolyte resistance. One of the pivotal assumptions in this analysis is that the system can respond in the time of an ocean wave period to the pressure oscillations. Accordingly, this assumption was tested experimentally using Nafion and filter paper impregnated with hydrochloric acid as the electrolytes and platinum as the electrode material. The assumption was experimentally validated and the power delivered by these cells under conditions of simulated three foot waves was measured as a function of load resistance and temperature. The power exhibited a peak as a function of load resistance and temperature. The power exhibited a peak as a function of load resistance, increased with a rise in temperature and sharply increased with an enhancement of the water content of the Nafion. The two latter observations are indicative of the importance of low cell resistance in achieving high conversion efficiencies. By combining the experimental results on power and cell resistance with results of the theoretical analysis of a potential system, it is concluded that 250 watts can be obtained from one square meter of ocean in a three foot sea. This 25% conversion efficiency can be obtained with presently available materials (Nafion and porous platinum electrodes). (ERA citation 05:011813)

PAT-APPL-6-030 806 PC A02/MF A01
Department of Energy, Washington, DC.
Electromechanical Solar Tracking Apparatus.
Patent Application,
R. P. Stromberg. Filed 17 Apr 79, 12p
Contract AT(29-1)-789
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

The invention relates to an electromechanical solar tracking device which tracks the position of the sun using paired, partially-shaded bimetallic elements. (ERA citation 05:018790)

PB80-169899 PC A05/MF A01
Montana State Univ., Bozeman. Dept. of Mechanical Engineering.
Technical Feasibility Study of a Wind Energy Conversion System Based on the Tracked Vehicle-Airfoil Concept.
Annual progress rept. 1 Sep-31 Dec 73,
R. E. Powe, H. W. Townes, D. O. Blackketter, and E. H. Bishop. 31 Jan 74, 93p NSF-RA-N-74-389
Grant NSF-GI-39415

Initial stages of a detailed technical feasibility study of a wind energy conversion system based on the tracked vehicle-airfoil concept are described. It is anticipated that the system will consist of airfoils mounted vertically on carriages which will move around a horizontal, closed track system. The orientation of the airfoils, relative to the winds will be automatically controlled to enable a maximum power extraction from the wind. During this first stage of the study, the performance specifications for the major system components required for converting wind energy to mechanical energy have been established, and the interface requirements between these components have been identified. Several possible alternatives for meeting these components and interface criteria have been selected, and a detailed study of a number of these alternatives is reported.

PB80-170962 PC A05/MF A01
Montana State Univ., Bozeman. Dept. of Mechanical Engineering.
Technical Feasibility Study of a Wind Energy Conversion System Based on the Tracked Vehicle-Airfoil Concept.
Progress rept. (Final), 1 Sep 73-31 Aug 74,
R. E. Powe, and H. W. Townes. 30 Sep 74, 85p NSF-RA-N-74-387, NSF-RANN/SE/GI-39415/PR/74/3
Grant NSF-GI-39415

The technical feasibility of a unique momentum interchange device for extraction of energy from the wind is studied. It is shown that the maximum possible energy extraction with this tracked vehicle-airfoil device is greater than that for a conventional windmill. A comprehensive mathematical model is developed for the device and this model is programmed for solution on a digital computer. The program is written so that wind spectrum data for any geographic location can be used to determine monthly energy output for that location. Indications are that this device could make significant contributions to electrical power requirements. For example, a system 8 km long and consisting of airfoils 12 meters in length with a 3 meter chord could supply the electrical energy needs of about 17,000 people. Results are presented in a form which indicates the effect of changing various design parameters. In addition, comparisons of the energy output of the tracked vehicle-airfoil system with typical windmills are made. It is found that the monthly energy output per unit of swept area for the tracked vehicle-airfoil system may be as much as 54 percent greater than that for an efficient windmill operating in the same location.

PB80-174386 PC A07/MF A01
Moore School of Electrical Engineering, Philadelphia, PA. Dept. of Electrical Engineering and Science.
Review of the Economics of Photovoltaic Power Systems.
Final rept.,
M. Wolf, and G. T. Noel. 27 May 77, 128p NSF/PRA-77-SP0317/1

The objective of this project was to review and evaluate the current state of knowledge regarding the economics of photovoltaic power systems and their components. In performing this evaluation, special attention was given to identifying the major factors which affect economic parameters, to identifying and evaluating fundamental limitations which might limit the potential for cost reduction, and to assessing the projected costs of photovoltaic power generating systems. The fundamental lower cost limits for many types of photovoltaic power generating systems. The fundamental lower cost limits for many types of photovoltaic cells were found to be adequately low. However, there was some concern expressed about the ultimately achievable cost levels for the complete, operative systems.

PNL-SA-6913 PC A02/MF A01
Battelle Pacific Northwest Labs., Richland, WA.
Assessment of Solar Thermal Conversion Options for Small Power Systems Applications.
W. J. Apley, W. W. Laity, and S. C. Schulte.
1978, 7p CONF-781235-6
Contract EY-76-C-06-1830
Symposium on commercialization of solar and conservation technologies, Miami Beach, FL, USA, 11 Dec 1978.

Under the sponsorship of the Small Power Systems Branch of the Division of Central Solar Technology, US Department of Energy, the Pacific Northwest Laboratory (PNL) is performing a project to identify, evaluate, and rank alternative solar thermal conversion concepts that have the potential for achieving commercial success as small electric power generation systems (1-10 MW/sub e/) with initial commercialization by the mid-1980s. Discussed are the tasks established for this project and the approach adopted for performing them. (ERA citation 05:009896)

PNL-SA-7531 PC A02/MF A01
Battelle Pacific Northwest Labs., Richland, WA.
Materials Resource Requirements and Potential Limitations in Solar Energy Products.
R. L. Watts. 1979, 21p CONF-790213-7
Contract EY-76-C-06-1830
Energy technology conference and exposition, Washington, DC, USA, 26 Feb 1979.

A systematic methodology is discussed that can aid energy technology managers in identifying future material pinch points. This methodology is used to examine 15 photovoltaic, 9 Solar Heating and Cooling of Buildings (SHACOB) and 3 Agriculture and Process Heat (AIPH) systems. The results indicate that many photovoltaic systems have no serious materials constraints. However, definite availability constraints exist for indium, gallium and germanium in some photovoltaic systems and, therefore, material management strategies will be required for the large scale implementation of these systems. No serious material availability problems are identified in the SHACOB or AIPH systems, although several materials should be monitored closely in the future. (ERA citation 05:009807)

PNL-SA-7619 PC A02/MF A01
Battelle Pacific Northwest Labs., Richland, WA.
Performance of US Electrodes-Insulators Tested in the USSR U-02. Phase III.
J. L. Bates, J. L. Daniel, B. Rossing, J. W. Sadler, and W. Hosler. 1979, 10p CONF-790640-8
Contract EY-C-06-1830
18. symposium on engineering aspects of magnetohydrodynamics, Butte, MT, USA, 18 Jun 1979.

The performance of La(Mg)CrO sub 3 and La(Mg)CrO sub 3 . ZrO sub 2 -base electrodes, MgO and MgAl sub 2 O sub 4 electrical insulators, and nickel-mesh compliant attachments (US-USSR test in U-02 Phase III) has been evaluated. The nickel mesh provided satisfactory electrical, thermal, and thermomechanical attachment. Major degradation of cathodes is attributed to enhanced electrochemical reaction of K sub 2 CO sub 3 midway between surface and attachment and ultimate hydration of reaction products. Extensive plasma surface reactions with Al sub 2 O sub 3 ,

introduced into channel by plasma from upstream components, caused extensive reaction with electrodes and insulators, surface flow, and bridging between electrodes. Chromium loss occurred near electrode surface due to thermal instability of LaCrO sub 3 . The monolithic MgO and MgAl sub 2 O sub 4 insulators fractured with seed penetration through the cracks. Loss of electrical isolation between electrodes attributed to this seed penetration and electrode surface bridging. (ERA citation 05:012061)

PNL-SA-7620 PC **A02**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Development of Electrodes Based on Yttrium Chromites and Rare Earth Doped Hafnia for MHD Generator Applications.
D. D. Marchant, and J. L. Bates. Oct 79, 8p
CONF-790640-9
Contract EY-76-C-06-1830
18. symposium on engineering aspects of magnetohydrodynamics, Butte, MT, USA, 18 Jun 1979.

Yttrium chromites are being studied as potential high temperature electrodes for MHD. Like lanthanum chromites, the doped yttrium chromites have similar high electrical conductivity, predominantly electronic over a wide temperature range; however, they do not form hydroscopic decomposition products, which cause gross structural degradation. In addition, they exhibit substantially improved resistance to electrochemical attack by slag/seed. The electrical conductivity, thermal diffusivity/conductivity, melting points, thermal expansion, vaporization and electrochemical corrosion for several yttrium chromite compositions are reported and compared with analogous lanthanum chromites. Hafnium oxide containing rare earth additions are also being studied as potential high temperature MHD electrodes. The electrode compositions show a high resistance to electrochemical corrosion in slag/seed. Hafnia-rare earth-M sub 2 O sub 3 oxides can be fabricated with sufficient room temperature electrical conductivity to make them candidates for ceramic-to-metal current leadouts. Electrochemical tests of ceramic current leadout: ceramic electrode couples have been conducted at high temperatures and with high current densities for long periods of time with little interaction between the electrodes and leadouts. (ERA citation 05:012062)

PSI-TR-191 PC **A03**/MF **A01**
Physical Sciences, Inc., Woburn, MA.
Coal Processing for Fuel Cell Utilization: Task X. Modeling of Condensation Phenomena in Entrained Flow Gasifiers.
P. Lewis, and J. Cronin. Oct 79, 44p
Contract EW-78-A-21-8450

In summary, reasonable estimates of thermodynamic properties and rate constants for chemical reactions have been used to predict the concentration of sulfur, chlorine, potassium and nitrogen species in an environment representative of entrained flow gasifiers. The results of these predictions indicate that the removal of sulfur and chlorine species from the gas phase by the addition of potassium species to the flow and through the heterogeneous condensation of KSH and KC1 is feasible. This hot-gas cleanup technique would be compatible with expected molten carbonate fuel cell requirements. The chemistry of NH sub 3 in entrained flow gasifiers was also analyzed and leads to the conclusion that fuel nitrogen which is released as NH sub 3 will appear in the product gas as NH sub 3 , with very little reduction due to chemical kinetics. Some correlation between NH sub 3 removal and NO initial concentration was observed. In conclusion, a well controlled and instrumented experiment to test the concept of hot-gas cleanup of S and Cl by the addition of potassium is needed. Further study of the distribution of particle sizes from gasifiers, their growth, agglomeration and source and removal requirements is needed. The possibility of the removal of fixed nitrogen (NH sub 3 and HCN) by additives should also be studied. (ERA citation 05:012905)

RFP-2920/3533/78/6-1
PC **A06**/MF **A01**
Atomics International Div., Golden, CO. Rocky Flats Plant.

First Semiannual Report: Rocky Flats Small Wind Systems Test Center Activities. Volume I. Description of the National Small Wind Systems Test Center.
28 Sep 78, 111p
Contract EY-76-C-04-3533

Information is presented concerning the Rocky Flats wind turbine test site; the philosophy of testing at Rocky Flats; test procedure development; atmospheric SWECS testing; SWECS component testing; data collection, handling, and analysis; reporting procedures; and future plans. (ERA citation 05:013480)

SAN-0959-T2 PC **A03**/MF **A01**
Jet Propulsion Lab., Pasadena, CA.
Thermoelectric Generator Testing and RTG Degradation Mechanisms Evaluation. Progress Report No. 33.
A. Lockwood, and G. Stapfer. Dec 79, 49p
Contract EY-76-A-03-0959

The n-type selenide legs after 10,600 hours continue to show agreement with the 3M Co. published data. In the ingradient testing after 11,378 hours the n-legs show comparable performance to the reported 3M data. The new design p-type legs were placed on test. The remaining MHW generator on test Q1-A has accumulated 19,567 hours and performance remains stable. Three 18 couple modules S/N-1, 2, and 3 previously tested at RCA were received for JPL test and evaluation. S/N-1 has 1700 hours testing at JPL with results indistinguishable from those at the end of RCA testing in 1977. The performances of LES 8/9 generators are following DEGRA predications after 31,824 hours. The performance of the Voyager 1 and 2 RTGs is reported after 19,577 hours and 20,122 hours of operation, respectively. (ERA citation 05:013722)

SAN-1282-6 PC **A03**/MF **A01**
Westinghouse Research and Development Center, Pittsburgh, PA.
Heterostructure Single Crystal Silicon Photovoltaic Solar Cells. Sixth Quarter Report, January 1, 1978-March 31, 1978.
J. R. Szedon, T. A. Temofonte, T. W. O'Keeffe, and S. J. Fonash. 11 Oct 78, 26p
Contract EY-76-C-03-1282

The use of scanned laser (6330A) spot excitation of MIS cells has allowed estimation of grain boundary geometry effects on V/sub OC/ and I/sub SC/ of cells prepared on polycrystalline silicon substrates. Cells on polycrystalline material prepared by Czochralski and dendritic web growth methods have been studied. Photocurrent suppression, by grating boundary recombination mechanisms, of about 3% was estimated for excitation at the laser wavelength for both materials. Details of total grain boundary length, width of the affected region and local strength of the suppression were different for the two cases. Bucking current density (assumed normal to the boundary walls cutting through the wafer) values were estimated to be 40 to 80% of those of the usual bucking current normal to the illuminated surface. Gold Schottky barrier and MIS cells on n-substrates exhibit barrier height and open circuit voltage sensitivity to details of the silicon etch preceding metallization or oxidation. TEM studies established that thin silver films on oxidized silicon surfaces show greater agglomeration (accounting for higher sheet resistance) than films of comparable thickness on bare silicon surfaces. (ERA citation 05:011467)

SAN-1282-7 PC **A03**/MF **A01**
Westinghouse Research and Development Center, Pittsburgh, PA.
Heterostructure Single Crystal Silicon Photovoltaic Solar Cells. Seventh Quarterly Report, April 1-June 30, 1978.
J. R. Szedon, T. A. Temofonte, H. C. Dickey, R. A. Hoffmann, and B. A. Blankenship. 1 Nov 78, 40p
Contract EY-76-C-03-1282

A number of approaches have been explored to improve the short circuit current-fill factor product of Al-SiO sub 2 -pSi cells from the point of view of the trade-off between optical transmission into the silicon and series resistance contribution from the high sheet resistance components of the cell. The approaches have involved material modification (evaporating aluminum in an oxygen containing ambient to improve transmission), partitioning the cell surface between alternate strips of metal (thin or thick) and bare silicon having an inversion layer and illuminating a carefully designed cell on the surface opposite that bearing the MIS collecting barrier. Experimental cells with comparable efficiency have been made with all four approaches. Details of cell operation and models for performance have been examined carefully. The inversion layer cell (with narrow opaque metal strips providing an MIS contact to an inversion layer over the full illuminated cell surface) is the most promising of the conventional approaches. The back illuminated cell with a BSF region is very attractive from standpoints of environmental stability, performance optimization and applicability of thin polycrystalline silicon films. Work at Penn State has established that the Al-SiO sub 2 -pSi cell is bulk diffusion controlled in dark current behavior and stores charge within the thin SiO sub 2 layer. (ERA citation 05:011468)

SAN-1285-T1 PC **A03**/MF **A01**
Southern Methodist Univ., Dallas, TX.
Thin Films of Silicon on Metallurgical Silicon Substrates. Phase II. Quarterly Project Report, March 1-May 31, 1978.
T. L. Chu. Jun 78, 32p
Contract EY-76-C-03-1285

The objectives of this contract are to investigate thin films of silicon on metallurgical silicon substrates and to demonstrate an AM1 efficiency of 10% for large area (30 cm exp 2) thin film silicon solar cells by August 1979. Efforts during the past quarter have been directed to the purification of metallurgical silicon, the preparation of substrates, the fabrication and characterization of solar cells, the reduction of grain boundary effects, and preliminary investigations of the stability of thin film polycrystalline silicon solar cells. The use of the acid extraction and phosphorus pentoxide treatment techniques for the removal of iron from metallurgical silicon has been continued. Metallurgical silicon purified by both techniques has been used to prepare substrates for the deposition of the active region of solar cells. Solar cells of 9 cm exp 2 area have been prepared from planar substrates recrystallized from acid-extracted and phosphorus pentoxide treated metallurgical silicon. The heat treatment of the deposited solar cell structures has been found to be essential to obtain good characteristics. Using chemically deposited tin-dioxide films as antireflection coatings, the best cell has an AM1 efficiency of 9.5% at room temperature. Preliminary work on the effects of thermal and optical stress on the characteristics of thin film polycrystalline silicon solar cells indicates that they are stable under conditions for terrestrial applications. (ERA citation 05:011470)

SAN-1458-3 PC **A02**/MF **A01**
Boeing Aerospace Co., Seattle, WA.
Cadmium Sulfide/Copper Ternary Heterojunction Cell Research. Quarterly Technical Progress Report, April 1-June 30, 1978.
R. Mickelsen, B. Selikson, and W. Chen. Jul 78, 15p
Contract EG-77-C-03-1458

The objective of this research program is the development of a thin-film photovoltaic solar cell based upon a cadmium sulfide/copper ternary compound heterojunction materials system. The ternary material is chalcopyrite CuInSe sub 2 formed by simultaneous elemental evaporation. The research effort has concerned the preparation and characterization of CuInSe sub 2 and CdS films and the fabrication and testing of 1 cm exp 2 area CdS/CuInSe sub 2 heterojunction thin-film devices. A modification to the vapor beam homogenization chamber structure used to deposit the selenide films is described. The successful modification was made to prolong the operational lifetime of the chamber without sacrificing deposited film uniformity. Grain size of CuInSe sub 2 is reported to be small (approx. 0.5 mu m) even for films subjected to relatively high processing temperatures. Doping the CdS film during growth with indium is described as an effective means for reducing the CdS resistivity and this contribution to the cell series resistance. Measurements are given indicating resistivities as low as 0.003 omega -cm.

I-V curves for fabricated cells are presented showing two types of cell behavior. Type 1 has high open circuit voltages and low short circuit currents while Type 2 possesses the reverse characteristics. Maximum values are given as 0.33 V, 23 mA/cm exp 2 , and 2% efficiency under simulated 100 mW/cm exp 2 illumination. (ERA citation 05:011471)

SAN-1483-1/1 PC **A04**/MF **A01**
Atomics International Div., Canoga Park, CA. Energy Systems Group.
Conceptual Design of Advanced Central Receiver Power Systems Sodium-Cooled Receiver Concept. Volume 1. Executive Summary. Final Report.
Jun 79, 64p ESG-79-2(V.1)
Contract EG-77-C-03-1483

The conceptual design of an advanced central receiver power system using liquid sodium as a heat transport medium has been completed by a team consisting of the Energy Systems Group (prime contractor), McDonnell Douglas, Stearns-Roger, The University of Houston, and Salt River Project. The purpose of this study was to determine the technical and economic advantages of this concept for commercial-scale power plants. This final report covers all tasks of the project. These tasks were as follows: (1) review and analysis of preliminary specification; (2) parametric analysis; (3) select commercial configuration; (4) commercial plant conceptual design; (5) assessment of commercial plant; (6) advanced central receiver power system development plan; (7) program plan; (8) reports and data; (9) program management; and (10) safety analysis. A programmatic overview of the accomplishments of this program is given. The 100-MW conceptual commercial plant, the 281-MW optimum plant, and the 10-MW pilot plant are described. (ERA citation 05:013329)

SAN-1483-1/2 PC **A17**/MF **A01**
Atomics International Div., Canoga Park, CA. Energy Systems Group.
Conceptual Design of Advanced Central Receiver Power Systems Sodium-Cooled Receiver Concept. Volume 2, Book 1. Commercial Plant Conceptual Design. Final Report.
Mar 79, 400p ESG-79-2(V.2)(Bk.1)
Contract EG-77-C-03-1483

The conceptual design of the 100-MW solar tower focus commercial power plant is described in detail. Sodium is pumped up to the top of a tall tower where the receiver is located. The sodium is heated in the receiver and then flows down the tower, through a pressure reducing device, and thence into a large, hot storage tank which is located at ground level and whose size is made to meet a specific thermal energy storage capacity requirement. From this tank, the sodium is pumped by a separate pump, through a system of sodium-to-water steam generators. The steam generator system consists of a separate superheater and reheater operating in parallel and an evaporator unit operating in series with the other two units. The sodium flowing from the evaporator unit is piped to a cold storage tank. From the cold storage tank, sodium is then pumped up to the tip of the tower to complete the cycle. The steam generated in the steam generators is fed to a conventional off-the-shelf, high-efficiency turbine. The steam loop operates in a conventional rankine cycle with the steam generators serving the same purpose as a conventional boiler and water being fed to the evaporator with conventional feedwater pumps. The pressure reducing device (a standard drag valve, for example) serves to mitigate the pressure caused by the static head of sodium and thus allows the large tanks to operate at ambient pressure conditions. (ERA citation 05:013330)

SAN-1485-1 PC **A08**/MF **A01**
Montana Energy and MHD Research and Development Inst., Inc., Butte.
Evaluation of MHD Materials for Use in High-Temperature Fuel Cells.
R. Guidotti. 15 Jun 78, 173p
Contract EC-77-C-03-1485

The MHD and high-temperature fuel cell literature was surveyed for data pertaining to materials properties in order to identify materials used in MHD power generation which also might be suitable for component use in high-temperature fuel cells. Classes of MHD-electrode materials evaluated include carbides, nitrides, silicides, borides, composites, and oxides. Y sub 2 O sub 3 -stabilized ZrO sub 2 used as a reference point to evaluate materials for use in the solid-oxide fuel cell. Physical and chemical properties such as electrical resistivity, coefficient of thermal expansion, and thermodynamic stability toward oxidation were used to screen candidate materials. A number of the non-oxide ceramic MHD-electrode materials appear promising for use in the solid-electrolyte and molten-carbonate fuel cell as anodes or anode constituents. The MHD-insulator materials appear suitable candidates for electrolyte-support tiles in the molten-carbonate fuel cells. The merits and possible problem areas for these applications are discussed and additional needed areas of research are delineated. (ERA citation 05:013725)

SAN-1570-1 PC **A02**/MF **A01**
TRW Systems and Energy, Redondo Beach, CA.
Ocean Thermal Energy Conversion (OTEC) Power System Development: Utilizing Advanced High Performance Heat Transfer Techniques. Final Technical Progress Report, August 1-December 11, 1978.
11 Dec 78, 17p
Contract EG-77-C-03-1570

The objectives of the program are: (1) development of a preliminary design for the full-sized power system module to be used in the 100 MWe OTEC Demonstration Plant by 1984 to demonstrate operational performance and to project economic viability; (2) preliminary design for a proof-of-concept 5 MWe (nominal pilot plant, (Test Article); (3) preliminary design for proof-of-concept 1 MWe scaled heat exchangers (Test Articles); and (4) preparation of a Phase II hardware and support plan (proposal) for the scaled test articles. Status of the program is described. (ERA citation 05:009900)

SAN-1572-T2 PC **A10**/MF **A01**
Parsons (Ralph M.) Co., Pasadena, CA.
System Design Verification of a Hybrid Geothermal/Coal Fired Power Plant.
Sep 78, 222p
Contract EG-77-G-03-1572

This hybrid plant utilizes geothermal fluid for feedwater heating. With respect to the extraction of available work from the geothermal fluids, this cycle is approximately two times as efficient as the all geothermal plant. The System Design Verification Study presented verifies the technical and economic feasibility of the hybrid plant. This report is comprised of a conceptual design, cost estimate, and economic analysis of a one-unit 715 MW hybrid geothermal/coal fired power plant. In addition to the use of geothermal fluid for feedwater heating, its use is also investigated for additional power generation, condensate and cooling tower makeup water, coal beneficiation, air preheating, flue gas reheating and plant space heating requirements. An engineering and construction schedule for the hybrid plant is also included. (ERA citation 05:011769)

SAN-1726-1(V.3) PC **A05**/MF **A01**
Boeing Engineering and Construction, Seattle, WA.
Closed Brayton Cycle Advanced Central Receiver Solar-Electric Power System. Volume III. Development Plan for a Commercial-Scale Closed Brayton Cycle Advanced Central Receiver Power Plant with Coupled Sensible Heat Storage. Final Report.
K. W. Halvorson. Nov 78, 95p
Contract EG-77-C-03-1726

A development plan is presented to advance the closed Brayton cycle, storage-coupled, Advanced Central Receiver Power Plant conceptual design to an initial commercial-scale operational plant in 1985. The plan describes the development approach utilized, the major program elements in the development path, and the technology items which must be improved and/or verified. The plan covers three sequential program phases. Phase II provides for technology development by Subsystem Research Experiments, analyses and test; the preliminary design of the initial 50 MW/sub e/ plant; and refinements to the Phase I conceptual design, costs, and schedules. Phase III provides the design phase for the 50 MW/sub e/ plant and the necessary permits and certifications. Construction, checkout, and operation of the 50 MW/sub e/ plant, and detailed design of the preferred 150 MW/sub e/ plant will occupy Phase IV. Program schedules and costs are estimated for the development phases. (ERA citation 05:011636)

SAN-1876-3 PC **A03**/MF **A01**
RCA Labs., Princeton, NJ.
Thin-Film Polycrystalline Silicon Solar Cells. Quarterly Report No. 3, 11 March 1979-10 June 1979.
B. W. Faughnan. Jul 79, 37p
Contract ET-78-C-03-1876

A total of 12 solar cells were fabricated this quarter; half had diffused junctions and half had ion-implanted junctions. Detailed quantum efficiency measurements were made on two of the cells, both inside a single grain and across several grains. The reduction of J/sub sc/ in going from a single crystal to a Wacker polycrystalline substrate is 6 to 8% due to bulk properties and 4 to 7% due to grain boundary effects. Laser scans were made at lambda = 1.15 mu m which showed greatly enhanced photo-response dips. Linewidths of the dips varied from 50 to 280 mu m depending on the cell. Electron channel patterns were determined for ten grains. No major crystallographic orientations were found, and some grains had an almost twin relationship. (ERA citation 05:013288)

SAN-2073-1 PC **A15**/MF **A01**
BDM Corp., Albuquerque, NM.
Conceptual Design and Analysis of a 100 MWe Distributed Line Focus Solar Central Power Plant. Topical Report, September 29, 1978-May 4, 1979.
M. G. Semmens, A. Fong, G. J. Collaros, R. E. Dascher, and R. E. Grassberger. 1979, 327p
Contract ET-78-C-03-2073

A program to develop the optimum line focus solar central power plant system conceptual design is reported in detail. The approach consisted of a parametric analysis of each of the seven major subsystems: collector, receiver tube, working fluid, heat transport subsystem, energy storage subsystem, electric power generating subsystem, and master control subsystem. Systems analysis and selection of the baseline 100 MWe line focus power plant are described. Detailed performance and cost summaries are included. (ERA citation 05:013336)

SAN-2219-2 PC **A03**/MF **A01**
RCA Labs., Princeton, NJ.
Amorphous Thin Films for Solar-Cell Applications. Quarterly Report No. 2, December 12, 1978 to March 11, 1979.
D. E. Carlson, I. Balberg, R. S. Crandall, J. J. Hanak, and J. I. Pankove. Apr 79, 47p
Contract ET-78-C-03-2219

The present research program involves five tasks: theoretical modeling, deposition and doping studies, experimental methods for the characterization of a-Si:H, formation of solar-cell structures, and theoretical and experimental evaluation of solar-cell parameters. In the section on theoretical modeling, a theory for the quantum efficiency to produce free electron-hole pairs in hydrogenated amorphous silicon (a-Si:H) is presented. Recent results obtained with the rf magnetron deposition system are reported. Experimental results are included that show the deleterious effect of adding either helium or hydrogen to an SiH sub 4 discharge. Other experiments have shown that adding SiF sub 4 to SiH sub 4 discharges decreases the photoluminescence intensity of the a-Si:H:F films. Experimental results for the band mobilities, minority-carrier diffusion lengths (approx. 0.05 to 0.18 mu m), and density of defect states are given. Information about the density of gap states has been obtained from measurements of the photoconductivity and from tunneling measurements. Information on some optimized fabrication parameters for inverted p-i-n cells is given. Also, the theoretical and experimental evaluation of solar-cell parameters is discussed. The breakdown voltage of p-i-n cells has been investigated, and a degradation has been observed in these cells after forward biasing to +3 V. The degrada-

tion of Pd-Schottky-barrier cells is due to the diffusion of Pd as well as OH groups into the a-Si:H. (ERA citation 05:011472)

SAN-2219-3 PC **A06**/MF **A01**
RCA Labs., Princeton, NJ.
Amorphous Thin Films for Solar-Cell Applications. Quarterly Report No. 3, 12 April 1979-11 July 1979.
D. E. Carlson, I. Balberg, R. S. Crandall, B. Goldstein, and J. J. Hanak. Jul 79, 109p
Contract ET-78-C-03-2219

A theory for the capture of electrons by deep centers in hydrogenated amorphous silicon (a-Si:H) is presented. In the section on deposition and doping studies, some recent results obtained with the rf magnetron deposition system are described. Other results show that additions of Ar to dc or ac SiH sub 4 , discharges cause the dark conductivity and photoconductivity to increase. Other data show that the addition of SiF sub 4 to SiH sub 4 discharges cause the photoluminescence intensity to decrease. In the section on experimental methods for characterizing a-Si:H, recent work involving photoconductivity spectra, the photoelectromagnetic effect, and the Hall effect in undoped a-Si:H is briefly described. Preliminary data on the photo-Hall effect indicates mobilities in the range of 1 to 13 cm exp 2 V exp -1 S exp -1 for electrons and 0.1 to 2.5 cm exp 2 V exp -1 S exp -1 for holes. Measurements of the surface photovoltage have been used to estimate the distribution of surface states on a-Si:H. Tunneling measurements have also been used to characterize the surface and bulk states in MIS junctions. A new technique for determining the optical absorption in the band-tail states in a-Si:H is described. Information on stacked or multiple-junction a-Si:H solar cells and on large-area, series-connected cells is given. In the section on theoretical and experimental evaluation of solar-cell parameters, the influence of photoconductive gain on the fill factor of a-Si:H cells is discussed, and an upper limit of approx. 380 A is established for the hole diffusion length in a-Si:H films made in an rf capacitive discharge. Some characteristics of Pd-Schottky-barrier cells for different processing histories are presented. (ERA citation 05:013289)

SAND-79-1781 PC **A03**/MF **A01**
Sandia Labs., Albuquerque, NM.
Extrinsic Losses in Solar Cells for Linear Focus Systems.
C. M. Garner. Dec 79, 42p
Contract EY-76-C-04-0789

Solar cell efficiency is dependent on the intrinsic one-dimensional diode efficiency and on the extrinsic losses (i.e., contact shadowing, series resistance and losses arising from nonuniform illumination). These extrinsic losses can depend on cell size and should be considered in the design of concentrator systems. The carrier transport and junction phenomena are arbitrarily called intrinsic effects, and the efficiency resulting from the one-dimensional transport equations will be called the intrinsic efficiency. The effects under consideration will be called extrinsic effects. The I exp 2 R and shadowing losses have been calculated as a function of cell size, contact thickness and number of buses. In addition, losses resulting from nonuniform illumination and temperature have been calculated. These results should give clear guidelines for the design of receivers for linear focus systems. (ERA citation 05:011473)

SAND-79-2345A PC **A02**/MF **A01**
Sandia Labs., Albuquerque, NM.
Distributed Automatic Test System for Characterizing Photovoltaic Arrays.
A. E. Verardo. 1980, 9p CONF-800109-1
Contract EY-76-C-04-0789
ATE seminar/exhibit and test instruments conference, Pasadena, CA, USA, 7 Jan 1980.

The automatic test system which is currently in use at the Advanced Concepts Photovoltaic Test Facility located at Sandia Laboratories in Albuquerque, New Mexico, is described. The equipment was designed to test various types of photovoltaic modules and arrays, as well as evaluate and operate all components of a complete photovoltaic power generation system. The test system uses a Hewlett Packard 21MX series minicomputer as the central processor and main controller. The main processor controls the bulk of the system mass storage devices which include a 5 megabyte and 20 megabyte disc and two 9 track magnetic tape recorders. The main processor also has data acquisition and control equipment. The main processor communicates with most of this equipment via an IEEE-488 bus. The main processor monitors the facility operation and the weather instrumentation, and it conducts tests on the large scale systems. (ERA citation 05:013290)

SAND-79-2445C PC **A02**/MF **A01**
Sandia Labs., Albuquerque, NM.
Active and Passive Cooling for Concentrating Photovoltaic Arrays.
M. W. Edenburn. 1980, 12p CONF-800106-3
Contract EY-76-C-04-0789
14. photovoltaics specialists conference, San Diego, CA, USA, 7 Jan 1980.

The optimization, based on minimum energy cost, of active and passive cooling designs for point-focus Fresnel lens photovoltaic arrays and line-focus, parabolic-trough photovoltaic arrays are discussed, and the two types of cooling are compared. Passive cooling is more cost effective than active for Fresnel lens arrays while the reverse is true for parabolic trough arrays. The analysis produced several other conclusions of interest which are also discussed. (ERA citation 05:009809)

SAND-79-7096 PC **A05**/MF **A01**
BDM Corp., Albuquerque, NM.
Investigation of the Technical and Economic Feasibility of Using Pumped Well-Water Energy Storage Systems. Final Report.
Dec 79, 92p
Contract EY-76-C-04-0789

The report presents a summary of the work completed on the three technical tasks of the project. The first task included a conceptual/preliminary system design, a selection of potential geographic locations in New Mexico for this system, and a study of relating institutional issues. The second task included a design of the baseline energy storage system with the identification of major components (off the shelf) and their associated performance characteristics, preliminary cost estimates for major system components, overall system performance estimates, and a proposed site location within New Mexico. The third task area included an estimate of the capital cost for the storage system (e.g., costs of major components and processes, O and M costs) and an estimate of the potential annual fossil fuel savings. (ERA citation 05:011963)

SAND-80-0076C PC **A02**/MF **A01**
Sandia Labs., Albuquerque, NM.
Protection of Terrestrial Photovoltaic Systems from Lightning Effects.
C. B. Rogers. 1980, 6p CONF-800106-6
Contract EY-76-C-04-0789
14. photovoltaics specialists conference, San Diego, CA, USA, 7 Jan 1980.

Transients caused by nearby strokes constitute the major threat from lightning to photovoltaic power systems. Failure thresholds of silicon solar cells are dominated by the melting of the metal grid on the illuminated face of the cell. The optical flash from lightning is not a significant threat to cells. The use of guard wires over underground cables appears to be a cost-effective shielding technique. Terminal protection devices are available although their use may require some special design features. (ERA citation 05:011608)

SAND-80-0110C PC **A02**/MF **A01**
Sandia Labs., Albuquerque, NM.
Photovoltaic System Sizing Analysis.
G. J. Jones, and E. M. Mehalick. 1980, 10p CONF-800106-20
Contract EY-76-C-04-0789
14. photovoltaics specialists conference, San Diego, CA, USA, 7 Jan 1980.

A primary concern in designing any photovoltaic system is the determination of its optimum size. In grid-connected applications this is normally considered to be one which delivers energy to the owner's load at the minimum lifecycle cost, including the cost of backup utility energy. A great deal can be learned about system design by making use of simple analytical relationships to study the effect of various design parameters on sizing. The purpose of this paper is to show one such model and apply it to study the effect of load and the fixed and variable costs on photovoltaic system sizing. (ERA citation 05:013315)

SAND-80-0112C PC **A02**/MF **A01**
Sandia Labs., Albuquerque, NM.
Qualification Testing of Photovoltaic Concentrator Modules for System Application Experiments.
J. F. McDowell, D. A. Pritchard, and A. E. Verardo. 1980, 14p CONF-800106-12
Contract EY-76-C-04-0789
14. photovoltaics specialists conference, San Diego, CA, USA, 7 Jan 1980.

Concentrator module performance qualification testing at Sandia Laboratories is described. The nature of the qualification tests, the control and data acquisition systems used and typical performance data on representative modules are discussed. Qualification testing is to be performed on modules assembled by final production processes and is designed to identify design/construction weaknesses rather than measure life expectancy. Three trackers will be used as will three independent computer-controlled data acquisition systems. The basic elements are the computer, control equipment, data acquisition instruments, a portable thermal loop, and programmable electronic load. (ERA citation 05:013291)

SAND-80-0141C PC **A02**/MF **A01**
Sandia Labs., Albuquerque, NM.
Photovoltaic System Cost Experience for Intermediate-Sized Applications.
E. L. Burgess. 1980, 14p CONF-800106-10
Contract EY-76-C-04-0789
14. photovoltaics specialists conference, San Diego, CA, USA, 7 Jan 1980.

This paper gives the prices for all system elements of nine experimental intermediate-sized photovoltaic systems which are presently being constructed. The balance-of-system pricing terminology adopted by the National Photovoltaic Program is used to categorize the system price elements. At this time the prices are estimates developed from preliminary and/or detailed system designs. (ERA citation 05:011609)

SAND-80-0142C PC **A02**/MF **A01**
Sandia Labs., Albuquerque, NM.
Low Cost Structures for Photovoltaic Arrays.
H. N. Post. 1980, 6p CONF-800106-9
Contract EY-76-C-04-0789
14. photovoltaics specialists conference, San Diego, CA, USA, 7 Jan 1980.

The design and analysis of low cost, ground-mounted flat plate non-tracking array structures for use in large intermediate and central power station applications are described. Design requirements for the array structure, especially wind loading criteria, are discussed and problem areas associated with the integration of the module panel and support structure are identified. Support system costs which include site preparation, foundation and support structure, and installation costs are summarized. Wind effects data derived from comprehensive wind tunnel tests of flat plate array field models are presented and compared with wind loading estimates based on existing design standards. (ERA citation 05:011610)

SAND-80-0143C PC **A02**/MF **A01**
Sandia Labs., Albuquerque, NM.
Photovoltaic Concentrators.
E. C. Boes. 1980, 10p CONF-800106-7
Contract EY-76-C-04-0789
14. photovoltaics specialists conference, San Diego, CA, USA, 7 Jan 1980.

A status report on photovoltaic concentrators technology is presented. The major topics covered are as follows: (1) current PV concentrator arrays: designs, performances, and costs; (2) current PV concentrator array components; cells and cell assemblies, optical concentrators, support structures, tracking, and drive; (3) design of PV concen-

trator arrays; and (4) array manufacturing technology. (ERA citation 05:011474)

SAND-80-0170C PC **A02**/MF **A01**
Sandia Labs., Albuquerque, NM.
Low-Cost, High-Performance, Point-Focus Concentrator Array Design.
B. D. Shafer, M. W. Edenburn, M. Garner, and H. Togami. 1980, 12p CONF-800106-19
Contract EY-76-C-04-0789
14. photovoltaics specialists conference, San Diego, CA, USA, 7 Jan 1980.

The design and fabrication of optimized photovoltaic concentrator arrays has been initiated which are meant to demonstrate the technology readiness of actual hardware for the 1980 goal of $2.80/Wp. Two basic approaches are being pursued in parallel. These are a point-focus Fresnel lens concept, and a linear-focus parabolic trough. The point-focus design is presented. The basic approach has been to meld together the best features of a number of designs done previously. These have been combined with extensive analysis, and some innovations to produce a design which will permit demonstration of the 1980 goal in terms of price, hardware performance, durability, and reliability. (ERA citation 05:013292)

SERI/TP-311-428 PC **A21**/MF **A01**
Solar Energy Research Inst., Golden, CO.
Proceedings: Photovoltaic Advanced R and D Annual Review Meeting.
1979, 483p CONF-791025-
Contract EG-77-C-01-4042
Photovoltaic advanced R and D annual review meeting, Denver, CO, USA, 17 Oct 1979.

Twenty-five of the twenty-seven papers were entered into the data base separately; two papers were previously included. (ERA citation 05:009810)

JCRL-15154 PC **A04**/MF **A01**
General Electric Co., Schenectady, NY. Materials and Processes Lab.
Laminated Composite Disc Flywheel Development. Second Interim Report, January 1979-June 30, 1979.
R. P. Nimmer, K. A. Torossian, and J. S. Hickey. Jul 79, 75p
Contract W-7405-ENG-48

The objective of the current program is to demonstrate a prototype practical flywheel design which has high energy storage capacity and also has the potential of being integrated into a hybrid flywheel/electric vehicle system. Quantitative program goals have been set as a 45 to 55 Wh/kg (20 to 25 Wh/lb) working energy density for wheels with a total storage capacity in the 1 to 2 kWh range. The goal for energy density at failure has been set at 88 Wh/kg (40 Wh/lb). Although even higher energy densities at failure are theoretically possible, our goals are tempered by the objective of demonstrating practical flywheel configurations which meet constraints of cost, fabricability, and system integration. (ERA citation 05:011969)

10C. Energy Storage

AD-A082 515/8 PC **A05**/MF **A01**
Army Aviation Research and Development Command St Louis MO
Comparison of On-Board Aircraft NiCad Battery Chargers.
Rept. for Jun 78-May 79,
Joseph D. Dickinson. Jan 80, 95p Rept no. USAAVRADCOM-TM-80-D-5

A test was conducted at the Applied Technology Laboratory at Fort Eustis, Virginia to establish the performance characteristics of several on-board aircraft NiCad battery chargers. The test assessed performance characteristics of chargers from Utah Research and Development Company, Aerospace Avionics Corp., Eldec Corp., and Chrysler Corp. These performance characteristics were also compared to the battery performance associated with a simulated aircraft bus charging source. Adjunct tests investigated battery maintenance procedures. (Author)

ANL/OEPM-78-10 PC **A07**/MF **A01**
Energy Research Corp., Danbury, CT.
Research, Development and Demonstration of Nickel-Zinc Batteries for Electric Vehicle Propulsion. Annual Report, 1978.
Oct 79, 139p
Contract W-31-109-ENG-38

This is the first annual report of progress achieved under ANL Contract 31-109-38-4248. It covers the report period from 15 March 1978 to 15 August 1978. The nickel electrode development program is directed at the optimization of the electrical performance, specifically, in terms of increased cycle life. The work concentrated upon both the development of pilot plant facilities to produce nickel hydroxide and upon optimizing the manufacturing processes to produce nickel hydroxide which has high electrochemical utilization. The primary goal of the zinc electrode studies is to increase the cycle life of this electrode. This effort is primarily concentrating on the effect of additives upon shape change and cycle performance and on the mechanistic processes involved in the shape change. The separator effort has as its major goal the development of a low-cost separator which exhibits stability in the electrolyte, has uniform pores which are of a sufficiently small size to impede the growth of zinc dendrites, and exhibits low electrical resistance and good flexibility. The process itself is now optimized for pilot plant manufacture; hundreds of formulations have been produced and subsequently screened in both the laboratory and in actual cells. Promising formulations are presently being subjected to additional characterization tests and life cycles. The goal of the sealed cell studies is to determine the feasibility of sealed-cell operation. Large numbers of 20-Ah cells have been subjected to accelerated testing. These cells incorporated separator variations, active material additives, and internal design variations. Cycle lives up to 150 deep cycles were achieved. Cell failure modes are analyzed. 51 figures, 20 tables. (ERA citation 05:010178)

ANL/OEPM-78-11 PC **A07**/MF **A01**
Gould, Inc., Rolling Meadows, IL. Gould Labs.
Research, Development and Demonstration of Nickel-Zinc Batteries for Electric Vehicle Propulsion. Annual Report for 1978.
Oct 79, 143p
Contract W-31-109-ENG-38

This is the first annual report describing progress in the 33-month cooperative program between Argonne National Laboratory and Gould Inc.'s Nickel-Zinc/Electric Vehicle Project. The purpose of the program is to demonstrate the technical and economic feasibility of the nickel-zinc battery for electric vehicle propulsion. The successful completion of the program will qualify the nickel-zinc battery for use in the Department of Energy's demonstration program under the auspices of Public Law 94-413. (ERA citation 05:013863)

ANL/OEPM-78-12 PC **A04**/MF **A01**
Yardney Electric Corp., Pawcatuck, CT.
Research, Development and Demonstration of Nickel-Zinc Batteries for Electric Vehicle Propulsion. Annual Report, 1978.
Oct 79, 64p
Contract W-31-109-ENG-38

The work carried out under the Yardney Contract with ANL for R, D and D on nickel zinc batteries over the past year was directed in three major areas: (1) elucidating the failure modes of the nickel-zinc battery system; (2) improving performance of the system; and (3) effecting a cost reduction program. Progress on the three areas is reported. (ERA citation 05:012154)

ANL/OEPM-78-8 PC **A06**/MF **A01**
ESB, Inc., Yardley, PA. ESB Technology Center.
Research, Development and Demonstration of Lead-Acid Batteries for Electric Vehicle Propulsion. Annual Report, 1978.
Oct 79, 106p
Contract W-31-109-ENG-38

The goals of the present R and D effort are to completely design, evaluate and construct two levels of electric vehicle batteries - Improved State-of-the-Art and Advanced. Research progress is reported. (ERA citation 05:010309)

ATR-78(7691-04)-1 PC **A09**/MF **A01**
Aerospace Corp., Los Angeles, CA. Energy and Resources Div.
New Applications of High-Temperature Solar Energy for the Production of Transportable Fuels and Chemicals and for Energy Storage.
19 Jan 79, 178p
Contract EY-76-C-03-1101

The solar fuels and chemicals study was limited to the examination of processes requiring temperatures in excess of 1000 exp 0 K since lower temperature processes had already been examined in studies concerned with the application of waste heat from nuclear power plants to industrial processes. In developing the carbon cycle processes, the primary activity included an extensive literature search and the thermodynamic evaluation of a number of candidate chemical cycles. Although both hydrogen and carbon closed- and open-loop chemical cycles were studied, it was concluded that the carbon cycles offered sufficient additional potential to warrant concentrating on them in subsequent work. The section on new ideas for transportable fuels presents the elements of a new concept for a carbon cycle recovery technique to produce transportable fuels. The elements discussed are sources of carbon dioxide, solar energy reduction of CO sub 2 , potential carbon cycles, and use of carbon monoxide as fuel and feedstocks. Another section presents some new concepts for the use of high-temperature solar energy in the production of essential materials and for closed-loop chemical storage, as well as for the production of hydrogen as a fuel and open-loop applications. Potential problem areas pertinent to solar-derived fuels and chemicals have been identified. These problems are primarily associated with the limited high temperature experience in industry and include materials compatibility, separation of reaction products, development of solid electrolytes and high-temperature electrodes, selective emission of receiver coatings at high temperature, and a lack of chemical kinetics data, and high-temperature thermodynamic data. (ERA citation 05:011673)

BCS-40252 PC **A04**/MF **A01**
Boeing Computer Services Co., Seattle, WA. Energy Technology Applications Div.
Developing and Upgrading of Solar System Thermal Energy Storage Simulation Models. Technical Progress Report, September 1, 1978-February 28, 1979.
J. K. Kuhn, G. F. von Fuchs, and A. P. Zob. May 79, 70p
Contract EG-77-C-02-4482

The purpose of this project is to select and upgrade solar energy storage models, incorporate these models into a computer simulation, validate the model with comparisons to measured data, and make these models available for use by engineering and architectural organizations. Progress is reported. The rock bed model selected for validation was further explored and compared to test data. Correlation with data from different experiments is showing improvement over the correlations reported in the last six month progress report. The present model is considered acceptable at this time but more confirmation of its accuracy would be desirable. Two more water tank models have been obtained, one from the University of Alabama and one from Colorada State University (CSU). Work has continued with model testing, validation and evaluation. Additional laboratory test data on water tank performance has been obtained. Some significant improvements have been made in the SOLSYS algorithm resulting in a more powerful simulation tool referred to as the Extended SOLSYS Model. That and the CSU model have been selected for streamlining and for incorporation into TRNSYS. (ERA citation 05:011699)

CAES-7 PC **A06**/MF **A01**
Massachusetts Inst. of Tech., Lexington. Lincoln Lab.
Application and Design Studies of Compressed-Air Energy Storage for Solar Applications. Final Report.
G. T. Flynn, and J. L. Nash-Webber. 28 Sep 79, 118p
Contract EX-76-A-01-2295-029

This report describes a study of adiabatic Compressed-Air Energy Storage (CAES), in which both the heat of compression and the compressed air are stored separately, and the applicability of this

technology to solar power systems. The basic thermodynamics of ideal single- and two-stage adiabatic CAES is reviewed. Generic single-stage and two-stage types are discussed, and efficiency and mass flow rate as a function of storage pressure and stage pressure ratios are investigated. The performance and cost of available turbomachinery for the single- and two-stage adiabatic systems are given in detail as the basis for evaluating sixteen candidate near-term single-stage and two-stage designs. Both excavated caverns and abandoned mines are considered for storage reservoirs. Two scenarios are considered regarding joint application of CAES and Solar Thermal Energy (STE) systems. One is based on providing local CAES storage for STE systems, other on providing solar-augmentation to adiabatic CAES installations. Both solar-heated thermal storage and fuel firing are considered for provision of necessary backup during bad weather. Solar-heated heat-topping of adiabatic CAES is also considered, but rejected as an unattractive technology. The economics of all these systems is ranked on the basis of delivered busbar energy cost for three different charging energy costs. The adiabatic systems are compared to fired systems to determine the breakeven cost of fuel which yields the same busbar energy cost. An economic comparison with pumped hydro and peaking gas turbines is also given. Recommendations for future development of this technology are presented. (ERA citation 05:008573)

COO-2564-5 PC **A04**/MF **A01**
Northwestern Univ., Evanston, IL.
Basic Research on Ceramic Materials for Energy Storage and Conversion Systems. Progress Report, December 1, 1978-November 30, 1979.
D. H. Whitmore. Dec 79, 55p
Contract EY-76-S-02-2564

The present research program involves utilizing appropriate experimental probes for measuring the movement of ionic and electronic charge carriers in ceramic materials suitable for solid electrolyte and electrode applications in high-performance, secondary battery and fuel cell systems. Special emphasis is placed on developing: (1) a better understanding of the effects of structure, impurities and composition on charge carrier transport mechanisms in such materials; and (2) detailed knowledge of the kinetics and mechanism of reactions occurring (on a microscopic scale) at the electrode-electrolyte interfaces of energy storage and conversion systems. (ERA citation 05:012067)

COO-4094-70 PC **A02**/MF **A01**
Massachusetts Inst. of Tech., Lexington. Lincoln Lab.
System Design, Test Results, and Economic Analysis of a Flywheel Energy Storage and Conversion System for Photovoltaic Applications.
A. R. Millner, and T. Dinwoodie. 1980, 7p CONF-800106-18
Contract EY-76-C-02-4094
14. photovoltaics specialists conference, San Diego, CA, USA, 7 Jan 1980.

MIT Lincoln Laboratory is developing a flywheel interface and storage system for use with photovoltaic power sources. Test data on the performance of components built to investigate the feasibility of such a system, and the results of economic studies of the system showing user-worth analysis and manufacturing-cost estimates, are presented. The system has magnetic bearings, a maximum-power-point tracker, DC input, and cycloconverter output from an ironless-armature motor-generator. (ERA citation 05:011965)

COO-4178-3 PC **A02**/MF **A01**
Massachusetts Inst. of Tech., Cambridge.
Photochemical Energy Storage: Studies of Inorganic Photoassistance Agents. Progress Report, December 11, 1978-March 31, 1980.
M. S. Wrighton. Dec 79, 23p
Contract EY-76-S-02-4178

Research has focused on the study of chemically derivatized photoelectrodes for conversion of light to electricity or fuels. Examples of completed research are given in the list of publications. Highlights of the period include (i) study of the derivatized n-type Si photoanode for oxidation of water soluble species such as I exp - , Fe(CN) sub 64- , and Ru(NH sub 3) sub 62+ ; (ii) demonstration that heterogeneous electron transfer rates between a surface-confined, photogenerated reagent and a solution reagent can be measured; (iii) demonstration that Fermi level pinning obtains for p-type semiconductors such as Si, GaAs, and InP; (iv) strained Si-C bonds can be used to functionalize surfaces; and (v) study of catalysis of H sub 2 evolution from illuminated p-type semiconductors. (ERA citation 05:011582)

DOE/CS/32939-7 PC **A02**/MF **A01**
Toronto Univ. (Ontario). Dept. of Mechanical Engineering.
Design Method to Determine the Optimal Distribution and Amount of Insulation for In-Ground Heat Storage Tanks.
G. T. Williams, C. R. Attwater, and F. C. Hooper. May 79, 5p CONF-790541-60
Contract EY-76-C-02-2939
International Solar Energy Society meeting, Atlanta, GA, USA, 28 May 1979.

The seasonal sensible heat storage model developed by F.C. Hooper and C.R. Attwater is modified to describe the thermal behaviour of the soil regime surrounding cylindrical, in-ground, heat storage tanks with optimally distributed insulation. The model assumes steady-state heat transfer, and the surrounding soil is considered to be homogeneous and isotropic. Changes in soil thermal properties due to moisture migration, whether driven by thermal or hydrostatic gradients, are assumed negligible. The optimal distribution is determined using the method of Lagrange multipliers. It is shown that the marginal cost per unit of energy lost and per unit of tank surface area must be the same at all points on the surface of the tank as the condition for minimum total heat loss with a given total investment in insulation. This condition appears to apply for all axi-symmetric in-ground tank geometries. For a given volume of insulation, the incremental increase in storage efficiency with an optimal redistribution of the insulation is a function of tank geometry. The problem of determining the optimal total investment in insulation for a given marginal cost of fuel is described and a method of solution is outlined. (ERA citation 05:013634)

DOE/NASA/1034-80/7 PC **A02**/MF **A01**
National Aeronautics and Space Administration, Cleveland, OH. Lewis Research Center.
Engineering Evaluation of a Sodium Hydroxide Thermal Energy Storage Module.
D. G. Perdue, and L. H. Gordon. Feb 80, 23p
NASA-TM-81417
Contract EC-77-A-31-1034

As part of the Department of Energy's Thermal Energy Storage Program, the NASA Lewis Research Center performed an engineering evaluation of storage prototypes to assess the development status of latent heat storage media. This report describes the testing and the evaluation of a prototype sodium hydroxide module developed by Comstock and Wescott, Inc. The module stored off-peak electrical energy as heat for later conversion to domestic hot water needs. (ERA citation 05:011970)

LA-UR-79-3098 PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
Energy Storage Technology-Environmental Implications of Large Scale Utilization.
M. C. Krupka, J. E. Moore, W. E. Keller, G. A. Baca, and R. I. Brasier. 1979, 20p CONF-791204-4
Contract W-7405-ENG-36
Miami international conference on alternative energy sources, Miami Beach, FL, USA, 10 Dec 1979.

Environmental impacts for several energy storage technologies have been identified. State-of-the-art control technology options were similarly identified. Recommendations for research and development on new control technology were made where present controls were either deemed inadequate or non-existent. Specifically, the energy storage technologies under study included: advanced lead-acid battery, compressed air, underground pumped hydroelectric, flywheel, superconducting magnet and various thermal systems (sensible, latent heat and reversible chemical reaction). In addition, a preliminary study was conducted on fuel cell technology. Although not strictly classified as an energy storage system, fuel cells in conjunction with product recycling units can serve an energy storage function. A very large number of potential environmental impacts can be identified for all of these technologies. However, not all are of primary importance. Detailed discussions of a number of environmental impacts from the latest LASL study as they relate to primarily operational situations are emphasized. In addition, a brief discussion on new application for energy storage technologies and the additional costs of controls to be used for mitigation of specific impacts are also presented. (ERA citation 05:008562)

LA-8199-PR PC **A03**/MF **A01**
Los Alamos Scientific Lab., NM.
Superconducting Magnetic Energy Storage (SMES) Program. Progress Report, January 1-December 31, 1979.
J. D. Rogers. Jan 80, 30p
Contract W-7405-ENG-36

Work is reported on the development of two superconducting magnetic energy storage units. One is a 30-MJ unit for use by the Bonneville Power Administration to stabilize power oscillations on their Pacific ac Intertie, and the second is a 1- to 10-GWh unit for use as a diurnal load-leveling device. Emphasis has been on the stabilizing system. A contract was placed for the fabrication design of the 30-MJ coil design. Orders have been placed for the stabilizing system converter and protective energy dump system, converter transformer, automation of the 4.5 K refrigerator and its installation into a trailer, and a trailer mounted heat-rejection system. A third compressor was added to the refrigeration system, and the refrigerator was tested and accepted. The superconductor for the 30-MJ coil has been received, tested, and found to be satisfactory. Development of the 5-kA superconducting cable is still under way. The reference design for the 1- to 10-GWh diurnal load-leveling unit was completed and has been issued as an eight volume report. The summary and recommendations of the study are included. An alternative use of small superconducting coils for VAR control has been devised. (ERA citation 05:013628)

LBL-10194 PC **A03**/MF **A01**
California Univ., Berkeley. Lawrence Berkeley Lab.
Multiple Well Variable Rate Well Test Analysis of Data from the Auburn University Thermal Energy Storage Program.
C. Doughty, D. McEdwards, and C. F. Tsang. Nov 79, 30p
Contract W-7405-ENG-48

The computer program ANALYZE is used to determine reservoir parameters and the unique location of a hydrologic boundary for the aquifer used by Auburn University in a series of aquifer thermal energy storage field experiments. ANALYZE can deal with several observation wells and account for variable flow rates in multiple production wells. Two injection tests and one production test were analyzed. All yielded similar values of reservoir parameters and barrier location. (ERA citation 05:011971)

LBL-9321 PC **A09**/MF **A01**
California Univ., Berkeley. Lawrence Berkeley Lab.
Sensible Heat Storage for a Solar Thermal Power Plant.
T. F. Baldwin, S. Lynn, and A. S. Foss. Jul 79, 195p
Contract W-7405-ENG-48
Thesis.

This report examines one possible configuration for a solar power plant with a sensible-heat storage unit. The proposed flowsheet allows thermal energy storage between the heat collection unit and the power generation unit without a reduction in the thermodynamic availability of the energy suppled to the power turbines. Energy is stored by heating a checkerwork of magnesia bricks. A gas that is circulated from the solar collector through the storage unit and the power plant boiler serves as the heat-transfer medium. Nitrogen was found to be preferable to helium for this purpose. A computer model was used to predict the behavior of the sensible-heat storage unit and to aid in sizing

the storage unit. Procedures were developed to estimate the cost of electricity generated by the solar power plant. These procedures illustrate the effects of changes in the energy storage unit on the cost of electricity. The effects on the storage unit and on the total plant design of changing several process and design parameters were then evaluated. This study has led to the design of two alternative process configurations for solar power plants with sensible-heat storage. The sensible-heat storage process was also compared to the sulfur oxide chemical-heat storage process. The proposed configuration for a solar power plant with sensible-heat storage for nighttime electricity generation produces electricity at the cost of $87 per MW/sub e/-hr.Both of these power plants convert 32% of the energy absorbed by their solar collectors into usable electric energy. It is concluded that sensible-heat storage can provide energy storage for a solar power plant at a reasonable price using technology that is presently available. (ERA citation 05:011633)

N80-20820/0 PC **A22**/MF **A01**
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.
The 1979 Goddard Space Flight Center Battery Workshop.
G. Halpert. Apr 80, 521p NASA-CP-2117
Workshop Held in Greenbelt, MD., 13-15 Nov. 1979.

No abstract available.

PAT-APPL-6-070 384 PC **A02**/MF **A01**
Department of the Air Force Washington DC
Hydraulic Seal Battery Terminal.
Patent Application,
Steven J. Stadnick. Filed 28 Aug 79, 9p AD-D007 135/7
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A self-sealing battery terminal including a hydroformed Inconel outer case, a low shear strength sealant material, and a central post in the form of a bolt which acts as both a conductor and transmits the preload from a pair of Belleville washers to a lower ceramic washer. The lower ceramic washer acts like a piston to compress the sealant when the nut on the central post is tightened. The Belleville washers seve to maintain a minimum tension on the central post. A top ceramic washer is held in place by the tension in the central bolt as long as the tension exceeds a minimum value. (Author)

PNL-SA-7669 PC **A02**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Compressed Air Energy Storage Technology Program in the United States.
W. V. Loscutoff. 1979, 8p CONF-790515-6
Contract EY-76-C-06-1830
International assembly on energy storage, Dubrovnik, Yugoslavia, 27 May 1979.

The development of compressed air energy storage (CAES) technology is a recognized objective of the United States Department of Energy. The specific objectives are to develop the technology to a level that will permit early commercialization of the concept and to develop advanced CAES systems that will not require any petroleum fuels for operation. The paper summarizes the CAES technology research and development program sponsored by the United States Department of Energy and provides a brief set of recommendations on the developments required for the commercialization of the concept. (ERA citation 05:011961)

PNL-3231 PC **A03**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Structural Analysis of Porous Rock Reservoirs Subjected to Conditions of Compressed Air Energy Storage.
J. R. Friley. Jan 80, 41p
Contract EY-76-C-06-1830

Investigations are described which were performed to assess the structural behavior of porous rock compressed air energy storage (CAES) reservoirs subjected to loading conditions of temperature and pressure felt to be typical of such an operation. Analyses performed addressed not only the nominal or mean reservoir response but also the cyclic response due to charge/discharge operation. The analyses were carried out by assuming various geometrical and material related parameters of a generic site. The objective of this study was to determine the gross response of a generic porous reservoir. The site geometry for this study assumed a cylindrical model 122 m in dia and 57 m high including thicknesses for the cap, porous, and base rock formations. The central portion of the porous zone was assumed to be at a depth of 518 m and at an initial temperature of 20 exp 0 C. Cyclic loading conditions of compressed air consisted of pressure values in the range of 4.5 to 5.2 MPa and temperature values between 143 and 204 exp 0 C.Various modes of structural behavior were studied. These response modes were analyzed using loading conditions of temperature and pressure (in the porous zone) corresponding to various operational states during the first year of simulated site operation. The results of the structural analyses performed indicate that the most severely stressed region will likely be in the wellbore vicinity and hence highly dependent on the length of and placement technique utilized in the well production length. Analyses to address this specific areas are currently being pursued. (ERA citation 05:013629)

SAND-79-7089 PC **A08**/MF **A01**
Sandia Labs., Albuquerque, NM.
Preliminary Development of the Band Type Variable Inertia Flywheel (BVIF). Final Report.
D. G. Ullman. Nov 79, 163p
Contract EY-76-C-04-0789

An energy storage flywheel with variable moment of inertia, combining the functions of energy storage and power control is introduced and studied. The specific configuration addressed is the Band Type Variable Inertia Flywheel (BVIF). This hollow shell flywheel is packed with long thin bands of flexible material mounted like the main spring in a watch. The performance equations of this configuration are derived and studied. A proof-of-concept model is described and conclusions are drawn on the BVIF'S operational potential. (ERA citation 05:010176)

SAND-80-0111C PC **A02**/MF **A01**
Sandia Labs., Albuquerque, NM.
Energy Storage in Grid-Connected Applications.
G. J. Jones. 1980, 8p CONF-800106-11
Contract EY-76-C-04-0789
14. photovoltaics specialists conference, San Diego, CA, USA, 7 Jan 1980.

While energy storage is usually an option when designing any photovoltaic system, in grid-connected applications the decision for or against on-site storage is based on operational considerations. If the photovoltaic system has the option of returning energy to the utility grid for credit, then the question of storage is determined by the capital cost of storage and its efficiency versus the cost of sell-back in terms of lost energy. The present paper analyzes this situation, as well as time-of-day pricing, in detal to determine the allowable lifecycle cost of storage in each of the possible operating modes. (ERA citation 05:013316)

SERI/TP-332-476 PC **A02**/MF **A01**
Solar Energy Research Inst., Golden, CO.
Biological Solar Cells.
M. Seibert, and A. F. Janzen. Nov 79, 7p CONF-791204-7
Contract EG-77-C-01-4042
Miami international conference on alternative energy sources, Miami Beach, FL, USA, 10 Dec 1979.

Recent reports have demonstrated the possibility of employing photoactive, biological membrane components in photoelectrochemical cells. Such systems have produced small photovoltages and photocurrents. Present studies in our laboratories have led to the attachment of a much simpler biological complex, the bacterial photosynthetic reaction center isolated from Rhodopseudomonas sphaeroides, directly onto an SnO sub 2 electrode. The light-induced primary charge separation processes which occur across the reaction center macromolecule have been coupled to the electrode, and in a two-electrode configuration photovoltages as high as 70 mV and photocurrents as high as 0.5 mu A/cm exp 2 have been observed in an external circuit. The phenomena are not due to biological Dember effects. Such reaction center electrodes may be the forerunner of future biological solar cells or may serve as model systems for future organic photovoltaic devices. (ERA citation 05:011584)

11. MATERIALS

11A. Adhesives and Seals

N80-20396/7 PC **A03**/MF **A01**
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, OH.
Composite Wall Concept for High Temperature Turbine Shrouds: Survey of Low Modulus Strain Isolator Materials.
R. C. Bill, G. P. Allen, and D. W. Wisander. Mar 80, 27p NASA-TM-81443, AVRADCOM-TR-80-C-7
Prepared in Cooperation with Army Aviation Research and Development Command, Cleveland. Presented at the 25TH Ann. Intern. Gas Turbine Conf., New Orleans, 9-13 Mar. 1980; Sponsored by Asme.

Plasma sprayed yttria stabilized zirconium oxide turbine seal specimens, incorporating various low modulus porous metal strain isolator pads between the zirconium oxide and a dense metal substrate, were subjected to cyclic thermal shock testing. Specimens that had a low modulus pad composed of sintered FeNiCrAlY fibermetal survived 1000 thermal shock cycles without spalling of the ceramic. A figure of merit for the low modulus pad materials taking into consideration the elastic modulus, thermal conductivity, strength, and oxidation resistance of the pad was proposed, and showed reasonable agreement with the thermal shock results. A potential surface distress problem on the zirconium oxide, associated with nonuniform temperature distribution and rapid stress relaxation was identified. One approach to solving the surface distress problem through application of laser surface fusion of the zirconium oxide layer showed some promise, but improvements in the laser surface fusion process are necessary to prevent process associated damage to the ceramic.

PAT-APPL-6-018 099 PC **A02**/MF **A01**
Department of Energy, Washington, DC.
Magnetohydrodynamic (MHD) Channel Corner Seal.
Patent Application,
F. R. Spurrier. Filed 6 Mar 79, 7p
Contract EF-77-C-01-2363
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A corner seal for an MHD duct includes a compressible portion which contacts the duct walls and an insulating portion which contacts the electrodes, sidewall bars and insulators. The compressible portion may be a pneumatic or hydraulic gasket or an open-cell foam rubber. The insulating portion is segmented into a plurality of pieces of the same thickness as the electrodes, insulators and sidewall bars and aligned therewith, the pieces aligned with the insulator being of a different size from the pieces aligned with the electrodes and sidewall bars to create a stepped configuration along the corners of the MHD channel. (ERA citation 05:018969)

PAT-APPL-6-022 896 PC **A02**/MF **A01**
Department of Energy, Washington, DC.
Cure-in-Place Process for Seals.
Patent Application,
A. R. Hirasuna. Filed 22 Mar 79, 12p
Contract EG-77-C-03-1308
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A cure-in-place process which allows a rubber seal element to be deformed to its service configuration before it is cross-linked and, hence, is a plastic and does not build up internal stress as a result of the deformation. This provides maximum residual strength to resist the differential pressure. Further-

more, the process allows use of high modulus formulations of the rubber seal element which would otherwise crack if cured and then deformed to its service configuration, resulting in a seal which has better gap bridging capability. Basically, the process involves positioning an uncured seal element in place, deforming it to its service configuration, heating the seal element, curing it in place, and then fully seating the seal. (ERA citation 05:018789)

SAND-78-1694 PC **A03**/MF **A01**
Sandia Labs., Albuquerque, NM.
Development of High Thermal Expansion Glasses for Sealing to Aluminum Alloys, I.
J. A. Wilder, Jr. Nov 78, 33p
Contract EY-76-C-04-0789

The feasibility of using phosphate glasses as insulator materials which can be hermetically sealed to aluminum alloys was examined. Control of selected properties was achieved by compositional variation. A series of glasses was produced with thermal expansion coefficients of 160 to 260 x 10 exp -7 exp 0 C exp -1 (aluminum = 235 x 10 exp -7 exp 0 C exp -1). Helium permeabilities of 5 x 10 exp 8 (atoms/s-cm-atm) at 25 exp 0 C are about equal to the glass-ceramic currently used in neutron tubes. Leach rates in water similar to those of window glass of approximately 1.2 x 10 exp -8 (gm/cm exp 2 - min) were attained. The fracture toughness of these glasses, 0.4 MPa - m/sup 1/2/, is approximately 1/2 that of silicate glasses. Several of these glasses have been hermetically sealed to 6061-TO aluminum alloy. (ERA citation 05:013919)

UCRL-52849 PC **A02**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Study of the Aging Processes in Polyurethane Adhesives Using Thermal Treatment and Differential Calorimetric, Dielectric, and Mechanical Techniques. I. Identifying the Aging Processes. II. Quantifying the Aging Effect.
L. P. Althouse, and N. W. Hetherington. 1 Nov 79, 22p
Contract W-7405-ENG-48

It is shown that the thermal aging of polyurethane adhesives involves competitive mechanisms that occur simultaneously as a function of time and temperature. These mechanisms involve chain scission and formation of pseudocrystalline domains. 12 figures, 2 tables. (ERA citation 05:010428)

11B. Ceramics, Refractories, and Glasses

AD-A082 760/0 PC **A03**/MF **A01**
Illinois Univ At Urbana-Champaign Dept of Ceramic Engineering
Densification of Zirconia with Borates.
Interim research rept. 1 Mar 79-28 Feb 80,
A. Sircar, and R. C. Buchanan. 24 Jan 80, 48p
Rept no. TR-3
Contract N00014-78-C-0279

Sintering studies carried out on submicron CaO (6.5 percent by weight) stabilized ZrO powders, showed borate additions (1-10 percent by weight) to be effective densification aids. Densities greater than 99% estimated theoretical were obtained at 1200 degrees C/4 hours, with 2 percent by weight B2O3 or 5 percent by weight CaO borate (CaO.2B2O3; (CaO.B2O3)) additions to these powders.

AD-A083 007/5 PC **A02**/MF **A01**
Rensselaer Polytechnic Inst Troy NY Dept of Materials Engineering
Chemical Durability Improvement and Static Fatigue of Glasses.
Annual rept. no. 2, 31 Mar 79-25 Feb 80,
Minoru Tomozawa. 25 Feb 80, 21p
Contract N00014-78-C-0315

Chemical durability of glass can be improved by applying a coating on the surface. It was also found that an addition of a minor quantity of calcium to the alkaline solution drastically improves the durability of glass. It was confirmed that calcium is deposited on the glass surface and protects the glass. It is suggested that this phenomenon of sorption is playing a important role in the chemical durability of glasses. The strength of glass is strongly influenced by the environment in which it is measured, but the exact cause of the phenomenon is not clear. Mechanical strength of high silica glass was measured in various liquids, as a function of strain rate. At a constant strain rate, the strength of glass measured in various liquid correlated well with the volume change of a high silica porous glass immersed in various liquids. These phenomena in turn showed a good correlation with the surface energy reduction of glass in liquids. These experiments suggest that the surface energy produces the mechanical stress which causes the volume change of porous glass and this stress influences the mechanical strength of glass. (Author)

FE-2218-31 PC **A03**/MF **A01**
Babcock and Wilcox Co., Alliance, OH. Contract Research Div.
Improvement of the Mechanical Reliability of Monolithic Refractory Linings for Coal Gasification Process Vessels. Quarterly Progress Report, January-March 1979.
E. M. Anderson. May 79, 46p
Contract EX-76-C-01-2218

This, the eleventh quarterly report on this DOE program, summarizes the physical and mechanical property testing done on the metal fiber containing 50% Al sub 2 O sub 3 dense refractory concrete and the results of three thermal cycles on Lining number 7 which contained this material. This lining cracked the least and had the best overall performance of any lining tested to date. The metal fibers are believed to be responsible for this improved performance. They make the dense component material more resistant to crack propagation and appear to make it act more uniformly to thermal and mechanical loading. The results suggest that more work should be done with this concept. (ERA citation 05:011063)

GA-A-15573 PC **A03**/MF **A01**
General Atomic Co., San Diego, CA.
Incremental Stress-Strain Law for Graphite under Multiaxial Loadings.
F. Tzung. Nov 79, 33p
Contract AT03-76ET35300

An incremental stress-strain law for describing the nonlinear, compressible and asymmetric behavior of graphite under tension and compression as well as complex loadings is derived based on a dry friction model in the theory of plasticity. Stress-strain relations are defined by longitudinal-lateral strain measurements for specimens under uniaxial tension-compression. Agreements with experimentally determined curves from biaxial loading experiments are shown. Agreements in finite element computations using the present model with strain measurements for diametral compression and 4-point bend tests of graphite are also obtained. (ERA citation 05:010396)

PNL-3228 PC **A03**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Design of a Capsule for Irradiating Graphite at Temperatures Up to 2000 exp 0 C.
W. J. Gray. Jan 80, 31p
Contract EY-76-C-06-1830

A non-instrumented capsule has been designed for irradiating graphite samples at temperatures up to 2000 exp 0 C, and a device for measuring the temperature has been designed and laboratory tested. Tungsten heater elements used to help achieve the high temperatures were found to react with the graphite even though there was no direct contact. Despite this reaction, laboratory tests indicate that the tungsten heater elements will be suitable for irradiations up to three or four weeks in duration. A description of the materials and properties to be tested for fusion reactor applications is also given. (ERA citation 05:013923)

11C. Coating, Colorants, and Finishes

AD-A082 598/4 PC **A02**/MF **A01**
California Univ Los Angeles
Acoustic Emission Study of Thermal-Sprayed Oxide Coatings.
Technical rept.,
Saed Safai, Herbert Herman, and Kanji Ono. 12 Jan 79, 2p Rept no. 79-05
Contract N00014-75-C-0419
Pub. in The American Ceramic Society Bulletin, v58 n6 p624 Jun 79.

No abstract available.

DOE/JPL/955387-1 PC **A02**/MF **A01**
Motorola, Inc., Phoenix, AZ. Semiconductor Group.
Anti-Reflection Coatings Applied by Acid Leaching Process. Quarterly Technical Report No. 1, April 1-June 31, 1979.
E. Pastirik. 1979, 13p
Contract NAS-7-100-955387

Progress during the first three months of a nine-month program to study the production of anti-reflective coatings for glass solar module covers by means of a silica-saturated fluosilicic acid etch is reported. The efforts of the program during this first quarterly period have been to set up the process and begin production of filmed sample glass plates. To this end, a temperature-controlled bath has been prepared, large quantities of the filming solution have been formulated, and production of samples has begun using empirically determined processes. (ERA citation 05:013279)

N80-20370/6 PC **A02**/MF **A01**
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, OH.
An Experimental, Low-Cost, Silicon-Aluminide High-Temperature Coating for Superalloys.
S. G. Young, and D. L. Deadmore. 1980, 16p
NASA-TM-81455, E-385
To Be Presented at the Intern. Conf. On Metal Coatings, San Diego, Calif., 21-25 Apr. 1980; Sponsored by the AM. Vacuum Soc.

An evaluation of a duplex silicon-slurry/aluminide coating is presented. The coating is cyclically tested in Mach 1 combustion gases for oxidation and thermal fatigue resistance at 1093 C and in Mach 0.3 gases for hot-corrosion resistance at 900 C. The base metal superalloys are ViA and B-1900. The coated B-1900 specimens performed much better in oxidation than similar specimens coated with aluminides and almost as well as the more expensive Pt-Al and MCrAlY (where M is Ni and/or Co) coatings deposited by the physical vapor deposition process. The coating also provided good hot corrosion protection. Metallographic, X-ray, and electron microprobe studies are used to characterize the coating, determine failure mechanisms, and study some of the changes due to exposure.

N80-20818/4 PC **A06**/MF **A01**
Eagle-Picher Industries, Inc., Miami, OK. Miami Research Labs.
Study Program to Develop and Evaluate die and Container Materials for the Growth of Silicon Ribbons.
Final Report.
L. A. Addington, P. D. Ownby, B. B. Yu, M. W. Barsoum, and H. V. Romero. Dec 79, 124p
NASA-CR-162899, DOE/JPL-954877-79/6
Contracts NAS7-100, JPL-954877

The development and evaluation of proprietary coatings of pure silicon carbide, silicon nitride, and aluminum nitride on less pure hot pressed substrates of the respective ceramic materials, is described. Silicon sessile drop experiments were performed on coated test specimens under controlled oxygen partial pressure. Prior to testing, X-ray diffraction and SEM characterization was performed. The reaction interfaces were characterized after testing with optical and scanning electron microscopy and Auger electron spectroscopy. Increasing the oxygen partial pressure was found to increase the molten silicon contact angle, apparently because adsorbed oxygen lowers the solid-vapor interfacial free energy. It was also found that adsorbed oxygen increased the degree of attack of molten silicon upon the chemical vapor deposited coatings. Cost projections show that reasonably priced, coated, molten silicon resistant refractory material shapes are obtainable.

PAT-APPL-6-126 088 PC **A02**/MF **A01**
Department of the Navy Washington DC

Semiconductor Encapsulant for Annealing Ion-Implanted GaAs.
Patent Application,
John E. Davey, Aristos Christou, and Harry Be. Dietrich. Filed 29 Feb 80, 8p AD-D007 079/7
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A method for protecting an ion-implanted substrate during the annealing process by covering the ion-implanted layer with a suitable encapsulant. A thin layer of ions are implanted into a GaAs substrate. A protective layer of germanium, amorphous GaAs, doped GaAs, or GaAlAs is applied over the implanted layer and on the periphery of the ion-implanted GaAs substrate. The composite is annealed at a temperature which is adequate for the lattice to recover from the ion-implantation-induced damage. The protective layer is removed subsequent to the anneal step, without any damage to the ion-implanted layer. (Author)

PAT-APPL-6-129 437 PC **A02**/MF **A01**
Department of the Air Force Washington DC
Solvent Mixture for Removing Polyurethane Coatings.
Patent Application,
John L. Elwell, Jr. Filed 11 Mar 80, 8p AD-D007 128/2
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

The present invention concerns itself with a solvent mixture that is especially adapted for dissolving and removing polyurethane synthetic resins in the form of coatings, foamed encapsulants, paints and insulation foams. The solvent mixture is effective in removing polyurethane compounds strictly through solvent activity without the need for an additional abrading or grinding action which often results in inflicting excessive damage to polyurethane coated, electronic compcnents. The solvent solution consists essentially of a mixture of dichloromethane, dimethyl formamide and methanol. The solvent mixture's effectiveness appears to reside in its ability to achieve slight solvation with maximum swelling. This affects the adhesive bond of the polyurethane compound thereby facilitating easy removal with little or no damage to the polyurethane coated subsrate or electronic component.

11D. Composite Materials

AD-A082 846/7 PC **A11**/MF **A01**
Air Force Wright Aeronautical Labs Wright-Patterson AFB OH
Proceedings of the Annual Mechanics of Composites Review (5th), 30 October - 1 November 1979,
Karyn T. Knoll. Jan 80, 235p Rept no. AFWAL-TR-80-4020

This report contains summaries of the presentations at the Fifth Mechanics of Composites Review sponsored by the Air Force Materials Laboratory. Each paper was prepared by its presenter and is published here unedited. In addition to the presenter's summaries, a listing of both the inhouse and contractual activities of each participating organization is included. (Author)

EGG-1183-1717(Rev.1) PC **A04**/MF **A01**
EG and G, Inc., Las Vegas, NV. Energy Measurements Group.
Corner Burn Test of Composite Materials.
A. D. Adamitis, and F. M. Bowman. Nov 79, 72p
Contract EY-76-C-08-1183

The test shows that the combination of the fire retardant materials did withstand the type of fire anticipated in a typical trailer, minimizing damage and losses to the facility. The possibility of a total loss due to fire in a structure built of these materials would be reduced significantly if fuel loading does not exceed 14 pounds. Also, the combination of fire retardant materials did not create dangerous outgassing or the possibility of explosion due to vapor mixture. Additionally, the test establishes a base of information that can be used for comparison, if other labeled materials were chosen for construction. The original mock-up structure was not affected by the testing; therefore, future experiments could be conducted at considerably reduced costs to the experimenters. (ERA citation 05:013926)

N80-20311/0 PC **A05**/MF **A01**
Little (Arthur D.), Inc., Cambridge, MA.
An Assessment of the Risks Presented by Carbon Fiber Composites Released from Motor Vehicle Fires.
D. B. Rosenfield, J. Fiksel, and A. Kalelkar. Mar 80, 87p NASA-CR-159207, DOT-TSC-RSPA-80-4
Contract NAS1-15380
Sponsored in Part by DOT.

A risk assessment was conducted to estimate the potential losses through 1993 due to the usage of carbon fiber (CF) composites in U.S. motor vehicles, including automobiles and trucks. A methodology was developed to compute estimated dollar losses by county and equipment type, using a Poisson model for the incidence of equipment failures. This approach incorporated data on the geographic distribution of potentially vulnerable facilities, as well as the mean CF exposure levels at which various equipment would fail. The results were then statistically aggregated to produce a national risk profile for estimated annual losses in 1993. The expected loss was $5,567 per year (1977 dollars), and the likelihood of exceeding $500,000 in annual losses was estimated to be at most one in ten thousand. The sensitivity of these results to major input parameters was investigated, and it was found that under extreme worst-case assumptions the annual loss would increase to about $1.5 million.

N80-20314/4 PC **A02**/MF **A01**
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, OH.
Calculation of Residual Principal Stresses in CVD Boron on Carbon Filaments.
D. R. Behrendt. 1980, 15p NASA-TM-81456, E-386
Prepared for the 4TH Ann. Conf. On Composites and Advanced Mater., Cocoa Beach, Fla., 21-24 Jan. 1980; Sponsored by the AM. Ceram. Soc.

A three-dimensional finite element model of the chemical vapor deposition of boron on a carbon substrate (B/C) is developed. The model includes an expansion of the boron after deposition due to atomic rearrangement and includes creep of the boron and carbon. Curves are presented showing the variation of the principal residual stresses and the filament elongation with the parameters defining deposition strain and creep. The calculated results are compared with experimental axial residual stress and elongation measurements made on B/C filaments. For good agreement between calculated and experimental results, the deposited boron must continue to expand after deposition, and the build up of residual stresses must be limited by significant boron and carbon creep rates.

N80-20315/1 PC **A04**/MF **A01**
SRI International Corp., Menlo Park, CA.
Development of Larc 160/NR150B2 Polyimide Graphite Hybrid Composites.
M. G. Maximovich, O. Bergren, and S. Lockerby. Mar 80, 61p NASA-CR-159196
Contract NAS1-15433

A method for co-curing NR150B2 and LaRC 160 prepregs into hybrid composites was developed. The processing characteristics and the properties of the hybrid composites were compared with those of laminates fabricated from the individual component prepregs. Resin forms were selected and optimized and a new NR150 formulation was investigated. The new formulation greatly facilitated the processing and the performance of this system. Quality control techniques were evaluated and developed, high quality laminates were fabricated from both individual resin systems, and hybrid laminates were successfully co-cured. Optimum hybrid forms were investigated and several novel approaches were explored. An optimum hybrid system was developed that utilizes a LaRC curing schedule but shows no degradation of mechanical properties after aging 500 hr in air at 260 C.

N80-20316/9 PC **A05**/MF **A01**
Boeing Aerospace Co., Seattle, WA.
Design, Fabrication and Test of Graphite/Polyimide Composite Joints and Attachments for Advanced Aerospace Vehicles.
Quarterly Technical Progress Report, 1 Jul. - 30 Sep. 1979.
D. E. Koumal. Oct 79, 92p NASA-CR-159110, QTPR-3
Contract NAS1-15644

The design and evaluation of built-up attachments and bonded joint concepts for use at elevated temperatures is documented. Joint concept screening, verification of GR/PI material, fabrication of design allowables panels, definition of test matrices, and analysis of bonded and bolted joints are among the tasks completed. The results provide data for the design and fabrication of lightly loaded components for advanced space transportation systems and high speed aircraft.

N80-20324/3 PC **A07**/MF **A01**
Technische Univ., Berlin (Germany, F.R.). Inst. fuer Luft- und Raumfahrt.
Damping of Anisotropic Composites Studied from the Properties of the Rolled Components Verfahren Zur Bestimmung des Daempfungsverhaltens Anisotroper Verbundbauteile Aus den Eigenschaften der Laminatkomponenten.
K. Kehl. 1978, 137p ILR-41, ISBN-3-79830-660-5
Text in German.

The rigidity and damping properties of the glass and carbon fiber reinforced plastics (GFK and KFK), were studied as well as applications to determining the frequencies and damping in the rolled product. Coefficients of rigidity for surface planes of disk and plates in the case of linear tension and torsion were calculated. Dynamic behavior, including unidirectional and multidirectional loads for composite materials was analyzed. The influence of temperature, frequency of vibration, and fiber orientation on the behavior of the reinforced plastics, and their applications were determined. The manufacture of membranes, tanks, tubes, and pipes was demonstrated.

PB80-165731 Not available NTIS
National Bureau of Standards, Washington, DC.
Orotropic Elastic Stiffnesses of a Boron-Aluminum Composite.
Final rept.,
H. M. Ledbetter. 12 Dec 79, 2p
Pub. in Journal of Applied Physcis 50, n12, p8247-8248, 12 Dec 79.

Measuring 18 separate ultrasonic velocities in a uniaxial boron-fiber-reinforced aluminum-matrix composite by a 10-MHz pulse-echo technique reveals orthotropic symmetry and provides nine independent elastic-stiffness constants, which compare favorably with those measured previously by a resonance method at lower frequency.

PB80-169626 PC **A07**/MF **A01**
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Engineering Science and Mechanics.
Transverse Microcracking in Celion 6000/PMR-15 Graphite-Polyimide.
Interim rept. no. 17,
J. Steven Mills, Carl T. Herakovich, and John G. Davis, Jr. Dec 79, 131p VPI-E-79-35
Grant NGR-47-004-129

The effects of room temperature tensile loading and five thermal loadings, in the range -320F (-196C) to 625F (330CC), upon the development of transverse microcracks (TVM) in Celion 6000/PMR-15 graphite-polyimide laminates were investigated. Microcracks were observed using a replicating technique, microscopy and x-ray. The mechanical or thermal load at which microcracking initiates and the ply residual stresses were predicted using laminate analysis with stress- and temperature-dependent material properties. TVM density as a function of tensile load was predicted using the multiple cracking theory proposed by Garrett, Parvizi and Bailey.

11E. Fibers and Textiles

N80-20312/8 PC **A03**/MF **A01**
Moore School of Electrical Engineering, Philadelphia, PA. Dept. of Electrical Engineering and Science.

High Electrical Resistivity Carbon/Graphite Fibers.
Final Report.
F. L. Vogel, and W. C. Forsman. 17 Apr 80, 26p
NASA-CR-162909
Grant NSG-1596

Carbon/graphite fibers were chemically oxidized in the liquid phase to fibers of graphite oxide. Resistivity increases as high as 10,000 times were obtained, the oxidized fiber decomposed on exposure to atmosphere. A factor of 1,000 remained as a stable increment. The largest change observed was 1,000,000 times. Best results were obtained on the most highly graphitized fibers. Electrochemical oxidation yielded a lower increase--about 10 times, but provided a controllable method of synthesis and insight to the mechanism of reaction. Tensile tests indicated that the strength of the fiber on oxidation was decreased by no more than 25 percent.

N80-20313/6 PC **A03**/MF **A01**
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, OH.
Dynamic Modulus and Damping of Boron, Silicon Carbide, and Alumina Fibers.
J. A. Dicarlo, and W. Williams. 1980, 44p NASA-TM-81422, E-345
Presented at the 4TH Ann. Conf. On Composites and Advanced Mater., Cocoa Beach, Fla. 20-24 Jan. 1980: Sponsored by the AM. Ceram. Soc.

The dynamic modulus and damping capacity for boron, silicon carbide, and silicon carbide coated boron fibers were measured from-190 to 800 C. The single fiber vibration test also allowed measurement of transverse thermal conductivity for the silicon carbide fibers. Temperature dependent damping capacity data for alumina fibers were calculated from axial damping results for alumina-aluminum composites. The dynamics fiber data indicate essentially elastic behavior for both the silicon carbide and alumina fibers. In contrast, the boron based fibers are strongly anelastic, displaying frequency dependent moduli and very high microstructural damping. Ths single fiber damping results were compared with composite damping data in order to investigate the practical and basic effects of employing the four fiber types as reinforcement for aluminum and titanium matrices.

11F. Metallurgy and Metallography

AD-A082 456/5 PC **A02**/MF **A01**
Rockwell International Thousand Oaks CA Science Center
Influence of Alpha/Beta Interface Phase on Fracture Toughness and Fatigue Crack Growth Rate in Ti-6Al-4V.
Technical rept. 1 Feb 78-31 Jan 79,
C. G. Rhodes. Feb 80, 25p Rept no. SC5056.5TR
Contract N00014-76-C-0598

The alpha/beta interface phase is a microstructural feature which occurs in two-phase, alpha/beta, titanium alloys under certain processing conditions. Interface phase can grow to widths of up to approx. 500 nm and has been shown to exert an influence on tensile properties. In this work, its influence on fracture toughness and fatigue crack growth rate in Ti-6Al-4V has been examined. (Author)

AD-A082 457/3 PC **A06**/MF **A01**
Lockheed-California Co Burbank
Investigation of the Mechanical and Corrosion Properties of MA-87 Aluminum Powder Alloy.
Final rept.,
Roy W. Brodie, and Leon Bakow. Dec 79, 103p LR-29293, NADC-78185-60
Contract N62269-78-C-0446

Mechanical, corrosion and fracture properties were determined for two MA87(CT91)-T7E69 powder alloy extruded shapes. Four lots of material were extruded and heat treated in production facilities. Mechanical properties including tensile, compression, shear and bearing were comparable to available data for 7075-T6 extrusions. The MA87(CT91)-T7E69 extrusions were resistant to exfoliation when exposed to EXCO, salt spray, or sea coast environments, although pitting was observed.

AD-A082 526/5 PC **A06**/MF **A01**
Texas Univ At Austin
The Influence of Hold Times on Fatigue Crack Growth of Aluminum Alloys.
Final rept. 1 Jan 76-31 Dec 79,
H. L. Marcus. 21 Feb 80, 106p AFOSR-TR-80-0233
Grant AFOSR-76-2955

The results of the research on fatigue crack growth in aluminum alloys are described in three general areas. The first relates the influence of hold time at an underload that follows an overload on the fatigue crack growth retardation behavior of the 7075 and 2219 aluminum alloys. A very distinct effect on retardation with hold time is observed. The effect is microstructure dependent with the time dependence behavior extending over a longer period for the high strength materials. This well-defined time dependence clearly shows that lifetime predictions based on accelerated short hold time tests could be very non-conservative. The influence of humidity was also determined using vacuum as a reference environment. The second aspect of the research investigated the nature of the residual displacement, d, that leads to the crack closure phenomena. The last major emphasis was to investigate how gaseous environments interact with fatigue crack growth in aluminum alloys. Combined AES/SIMS studies were made of fracture surfaces taken from fatigue crack growth specimens fatigued in vacuum and subsequently exposed to and fatigued in a range of environments.

AD-A082 600/8 PC **A02**/MF **A01**
Electrochemical Technology Corp Seattle WA
Occurrence of Salt Films during Initiation and Growth of Corrosion Pits.
Interim rept. Mar 79-Feb 80,
Theodore R. Beck, and Richard C. Alkire. 25 Jan 79, 8p
Contract N00014-76-C-0495
Pub. in Jnl. of the Electrochemical Society, v126 n10 p1662-1663 Oct 79.

No abstract available.

AD-A082 623/0 PC **A03**/MF **A01**
Rensselaer Polytechnic Inst Troy NY Dept of Mechanical Engineering Aeronautical Engineering and Mechanics
The Rate (Time)-Dependent Behavior of Ti-7Al-2Cb-1Ta Titanium Alloy at Room Temperature under Quasistatic Monotonic and Cyclic Loading,
D. Kujawski, and E. Krempl. Dec 79, 41p Rept no. RPI-CS-79-5
Contract N00014-76-C-0231

Uniaxial tests using a servocontrolled testing machine and strain measurement at the gage length were performed on a high-strength, low-ductility, Titanium Alloy. Tests involved monotonic and cyclic loadings with strain rates between 2 x 10 to the minus 8th power to 10 to the minus 3rd power s to the minus 1st power, stress rates from 10 to the minus 1st power to 100 MPa s to the minus 1st power and short-term relaxation and creep tests. The inelastic behavior is strongly rate-dependent. Ratchetting is shown to increase as the stress rate decreases. No strain-rate history effect was found. A unique stress-strain curve is ultimately reached for a given strain rate irrespective of prior history as long as only positive stresses are imposed. In the plastic range the relaxation drop in a given time period depends only on the strain rate preceding the test and is independent of the actual stress and strain. The results are qualitatively in accordance with the viscoplasticity theory based on total strain and overstress. (Author)

AD-A082 720/4 Not available NTIS
Materials Research Labs Ascot Vale (Australia)
Void Formation in Defeated Aluminum Alloy Targets,
R. L. Woodward. 16 Sep 75, 3p
Availability: Pub. in Metallurgical Transactions A, v7A p894-896 Jun 76 (No copies furnished by DTIC).

No abstract available.

AD-A082 747/7 PC **A04**/MF **A01**
Air Force Materials Lab Wright-Patterson AFB OH
Surface Chemistry, Morphology and Wetting Characteristics of Ti6Al4V Adherends.
Final rept. Jul 76-Feb 79,
William L. Baun. Jan 80, 64p Rept no. AFML-TR-79-4155

This investigation is part of a program which looks at the effects of surface treatments on surface chemistry and morphology of titanium and titanium alloys. This part reports on the effect of surface treatments on the alloy titanium-6 aluminum-4 vanadium. Anodization as a surface preparation is considered and the effect of electrolyte pH is discussed. The chemistry, morphology, and contact angle for various treatments are described and experiments are discussed which approximate alloy use and cause changes which might be expected during the service lifetime of the alloy.

AD-A082 781/6 Not available NTIS
Defence Research Establishment Pacific Victoria (British Columbia)
Boiler and Turbine Component Failures,
R. D. Barer. 1978, 25p Rept no. DREP-REPRINT-78-3
Availability: Pub. in Metallography in Failure Analysis, p207-230 1978 (No copies furnished by DTIC).

No abstract available.

AD-A082 796/4 PC **A02**/MF **A01**
Naval Research Lab Washington DC
Fractographic and Microstructural Analysis of Stress Corrosion Cracking of A533 Grade B Class 1 Plate and A508 Class 2 Forging in Pressurized Reactor-Grade Water at 93 C.
Memorandum rept.,
V. Provenzano, K. Torronen, D. Sturm, and W. H. Cullen. 25 Jan 80, 21p NRL-MR-4121, AD-E000 383, NUREG-CR-1127
Contract NRC-RES-79-103

Stress corrosion cracking (SCC) studies were conducted in two commonly used pressure vessel steels: A533 Grade B Class 1 (A533-B-1) plate and an equivalent A508 Class 2 (A508-2) forging. The purpose of these studies was to determine the response of the materials in simulated pressurized water reactor environment. Round tensile specimens, 32 mm (1.25 in.) along the gage section and 9.5 mm (0.375 in.) in diameter, were bolt-loaded to 75 to 80 percent of yield and left in the water at 93 C for 2000 hr. At the end of this time period, the specimens were taken out of the water, unloaded, and examined by scanning electron microscopy (SEM) and by energy dispersive x-ray analysis. The specimen cut from A533-B-1 plate did not develop any cracks as a result of the SCC tests. Several cracks, some of which were visible with the unaided eye, had developed in the specimen that was cut from the A508-2 forging. A hydrogen-assisted cracking model has been proposed to explain the experimental results on A508-2 forging. Produced by a cathodic reaction and aided by the stress fields, hydrogen diffuses ahead of the crack tip to the inclusion sites. This causes a preferential decohesion at the inclusion matrix interfaces and subsequent cracking along inclusion bands. The absence of stress corrosion cracking in A533-B-1 plate tested under identical experimental conditions is mainly due to fewer inclusion and carbide particles and to the more refined bainitic microstructure of this steel. This type of microstructure is less susceptible to hydrogen-assisted cracking than the mainly pearlitic microstructure found in A508-2 forging.

AD-A082 811/1 Not available NTIS
Defence Research Establishment Valcartier (Quebec)
Jic Determination Using the Proposed Standard C-Shaped Specimen,
C. H. Laforce, and J. Morrison. 3 Jan 78, 5p DRB-REPRINT-4212
Presented at the American Society of Mechanical Engineers/CSME Joint Pressure Vessel and Piping Conference, held in Montreal, Canada, 25-30 Jun 78, paper-78-MAT-6 1978.
Availability: Pub. in Jnl. of Engineering Materials and Technology, v100 p248-252 Jul 78.

No abstract available.

AD-A082 873/1 Not available NTIS
Saskatchewan Univ Saskatoon

A Double-Etching Technique for Microstructural Analysis of Steel,
M. -W. Lui, and I. Le May. 1974, 13p DRB-REPRINT-4073
Availability: Pub. in Microstructural Science, v2 p35-47 1974 (No copies furnished by DTIC).

No abstract available.

AD-A082 914/3 Not available NTIS
Materials Research Labs Ascot Vale (Australia)
A Mechanism of Spherical Particle Formation in Wear Debris,
E. D. Doyle. 1 Jul 74, 5p
Availability: Pub. in Jnl. of the Australian Inst. of Metals, v19 n4 p276-279 Dec 74 (No copies furnished by DTIC).

No abstract available.

BNL-27113 PC **A03**/MF **A01**
Brookhaven National Lab., Upton, NY.
Special About Transition Metals in Alloy Phase Formation.
R. E. Watson, and L. H. Bennett. 1979, 26p
CONF-790219-13
Contract EY-76-C-02-0016
AIME annual meeting, New Orleans, LA, USA, 18 Feb 1979.

The d-electrons are special, though their bonding properties remain to be completely understood. It is recognized that d band broadening is the dominant term contributing to transition metal cohesion. It is also generally recognized that in compound formation between transition-metals and polyvalent metals, hybridization between d-bands and polyvalent atom p bands provides a significant contribution to the energy (for example there is such a term in Miedema's scheme). Less generally realized is that d-band hybridization leads to changes in d-electron counts at a transition metal site which are opposite in sign to the net charge transfer on or off the site. The renormalized atom picture of cohesion of the pure transition metals and consider the experimental evidence and the theoretical understanding of d charge transfer going the wrong way are reviewed. A picture of the electronegativity of transition metals based on this trend is developed. Charge transfer associated with equalizing the local chemical potentials in alloys is estimated. Friedel type model alloy calculations are reviewed. The implications of the experimental charge transfer information from Moessbauer isomer shifts to such model alloy calculations and to the strength of the Coulomb enery associated with charge transfer is considered. (ERA citation 05:010327)

CONF-781093-4 PC **A02**/MF **A01**
Argonne National Lab., IL.
Effects of Particle Size and Shape on Erosive Wear Mechanisms.
T. H. Kosel, A. P. L. Turner, and R. O. Scattergood. 1978, 18p
Contract W-31-109-ENG-38
TMS/AIME fall meeting, St Louis, MO, USA, 15 Oct 1978.

Scanning and transmission electron microscopy (SEM and TEM) were used to examine mechanisms of erosion of pure fcc metals by angular Al sub 2 O sub 3 particles and spherical glass microbeads. The depth of the subsurface dislocation damage was found by TEM to be greater for spherical particles than for angular ones. Higher angles of impact produce thicker layers of damage. Erosion with Al sub 2 O sub 3 particles was observed to result in embedding of Al sub 2 O sub 3 particle fragments for all angles of impact and velocities. For normal impact the Al sub 2 O sub 3 particle fragments cover most of the specimen surface, and for certain particle sizes and velocities the entire surface is covered with a composite layer of Al sub 2 O sub 3 fragments mixed with the specimen metal. Erosion mechanisms under such conditions are discussed. Incubation periods of the true erosion rate (after allowance for embedding effects) are observed for glass microbeads and also for larger Al sub 2 O sub 3 particles. This is probably due to gradual damage accumulation. (ERA citation 05:012196)

CONF-7909109-1 PC **A02**/MF **A01**
Argonne National Lab., IL.
Effects of Hydrostatic Pressure on the Changes in Elastic Constants Caused by Hydrogen in Vanadium and Nb sub 53 Ta sub 47.
E. S. Fisher, H. L. Alberts, and K. Katahara. 1979, 5p
Contract W-31-109-ENG-38
Ultrasonics Symposium, New Orleans, LA, USA, 26 Sep 1979.

Hydrogen dissolved in V, Nb or Ta or their solid solutions causes the C' shear modulus to decrease, whereas C sub 44 increases. These appear to be entirely different effects, with delta C' being a result of interstitial relaxation and delta C sub 44 arising from the electronic contribution. The apparent inverse dependence of delta C', i.e., relaxation strength, on atomic volume of the alloys implies that the positive hydrostatic pressure derivative of C' should decrease with addition of H. This prediction has been tested with duplicate measurements at ANL and at HIG on two different vanadium samples with measurements of C', C sub 44 and K (bulk modulus) to 3kb. The results show dC'/dP decreasing significantly by 8% and 6.5%, respectively at HIG and ANL, with no significant changes in dC sub 44 /dP or dK/dP. A second experiment on the alloy Nb sub 53 Ta sub 47 showed dC'/dP decreasing by 10% with addition of 4.4 at. % H, with no changes in dC sub 44 / dP or dK/dP. (ERA citation 05:012181)

CONF-800305-2 PC **A03**/MF **A01**
EG and G Idaho, Inc., Idaho Falls.
Materials Testing at the Hanna IV in Situ Coal Gasification Site.
D. W. Keefer, and T. M. Scoonover. 1980, 28p
Contract EY-76-C-07-1570
Corrosion/80 NACE meeting, Chicago, IL, USA, 6 Mar 1980.

Candidate structural alloy specimens were exposed for about 800 hours to the direct product gas stream from the Hanna IV underground coal gasification experiment. When the specimens were removed from the line, they were coated with a high-sulfur deposit from the product gas. A chemical analysis and the physical appearance of the coatings suggest that they are mixtures of condensed hydrocarbons, coal char, coal ash, and mineral particles from the overburden. Attack on the specimens was primarily corrosion rather than erosion. Mean penetration rates expressed in millimetres per year (mm/y) were calculated from weight loss data. Microscopic examination revealed areas of rather severe local attack on all alloys tested. There was no consistent difference in the amount of material removed from specimens with welds and those without welds. All specimens exposed at 45 exp 0 to the product gas flow had surface dents from impacting particles, while parallel specimens had none. Energy-dispersive X-ray and Auger electron spectra indicate that the few particles of deposits and/or corrosion products still clinging to the specimen surfaces after cleaning were oxides, rather than sulfides, with significant contents of aluminum and silicon in addition to iron. (ERA citation 05:011052)

COO-1367-109 PC **A02**/MF **A01**
Northwestern Univ., Evanston, IL.
Effect of Point Defects on Mechanical Properties of Metals. Technical Progress Report, December 1, 1979-January 31, 1980.
M. Meshii. Jan 80, 7p
Contract EY-76-S-02-1367

This progress report consists of five sections. The importance of morphological study in conjunction with mechanical tests is emphasized and is explained in niobium, the surface effect on crystal plasticity of niobium, surface film softening in Ni-plated iron, and the hydrogen charging effect in iron. (ERA citation 05:013913)

COO-2872-04 PC **A02**/MF **A01**
Ohio State Univ., Columbus. Dept. of Metallurgical Engineering.
Hydrogen Attack of Steel. Progress Report, April 1, 1979-March 31, 1980.
P. G. Shewmon. 2 Jan 80, 9p
Contract EY-76-S-02-2872

The objective of this work is to establish the atomic processes by which the hydrogen attack of pressure vessel steel occurs. The approach is to follow the growth kinetics using an exceptionally sensitive dilatometer and to compare these data with the predictions of models based on the postulated mechanisms. This is supplemented by scanning electron microscope (SEM) studies to establish the geometry and location of the growing methane bubbles. The steels used have been various commercial alloys because of our now confirmed suspicion that trace impurities, e.g., from dioxidation practice, play a central role in determining the nucleation and growth geometry of the bubbles or fissures. (ERA citation 05:012182)

COO-3158-81 PC **A10**/MF **A01**
Cornell Univ., Ithaca, NY. Materials Science Center.
Direct Determination of Radiation Damage Profiles in the Order-Disorder Alloys Ni sub 4 Mo and Pt sub 3 Co Irradiated with 500 to 2500 EV Ne exp + Ions.
J. Aidelberg. Oct 79, 221p
Contract EY-76-S-02-3158

Radiation damage produced in the order-disorder alloys Ni sub 4 Mo and Pt sub 3 Co by low-energy (500-2500 eV) Ne exp + ions has been observed directly, on an atomic scale, employing the field-ion microscope (FIM) technique. A new approach was developed to determine the radiation damage distribution in these alloys. In the case of the alloy Ni sub 4 Mo the measurements were based on the contrast differences between the FIM images of an ordered alloy, which were completely regular, and a disordered alloy which appeared as a random array of image points. FIM specimens of the ordered alloy Ni sub 4 Mo were irradiated in situ at 30 exp 0 K, and the side of the specimen exposed to the beam became disordered as a result of the implantation of the neon atoms. The change from an ordered state to a disordered state was detected by the controlled dissection of the specimen, on an atom-by-atom basis, employing the pulse field-evaporation technique. The amount of disordered metal, which was field-evaporated, to expose the perfectly ordered lattice, and some basic geometric relations gave the depth of radiation damage: the depth resolution was approx. = 2 A. A crystallographic directional dependence of the mean depth of radiation damage (anti x/sub d/) was observed and was attributed to the effect of channeling. For the non-channeling direction the value of anti x/sub d/ varied from approx. = 6 to approx. = 19 A as the irradiation energy was increased from 500 to 2000 eV. The experimental anti x/sub d/ versus Ne exp + ion energy relation agreed with the theoretical predictions of Winterbon, Sigmund and Sanders, and the results of the Monte Carlo computer simulation program, of Biersack and Haggmark, called TRIM. (ERA citation 05:012201)

COO-4246-11 PC **A03**/MF **A01**
Notre Dame Univ., IN. Dept. of Metallurgical Engineering and Materials Science.
Microstructural Effects in Abrasive Wear. Quarterly Progress Report, September 15-December 15, 1979.
N. F. Fiore, T. H. Kosel, M. Channigiri, V. Desai, and J. Fulcher. 15 Jan 80, 35p
Contract EF-77-S-02-4246

This is the 11th quarterly report describing research aimed at establishing quantitative relations between microstructure and wear resistance of highly alloyed materials, including high-Cr white irons and experimental Co-base and Ni-base powder metallurgy (PM) alloys. The specific types of wear under study are low-stress abrasion and gouging wear encountered in mining, coal conversion and transfer applications. The white irons range in carbide volume fracton (v/sub f/) from 10 to 45%. They are of carefully balanced composition to produce maximum carbide hardness, v/sub f/ and matrix hardenability at minimum alloy content. Effort has been devoted to metallographic characterization of these alloys and to low-stress abrasion testing against dry SiO sub 2 . Low-stress abrasion resistance passes through a maximum at intermediate v/sub f/, a finding which corroborates wet-sand, low-stress test results from another laboratory. Low- and high-matrix alloy content Co-base alloys are also under investigation. Both types of alloys have been processed by powder metallurgy (PM) to display a uniform array of fine, medium or coarse carbides in a FCC matrix. Extensive effort has been expended to develop metallo-

graphic procedures for characterizing the microstructures of the alloys. Of particular significance is the development of a one-step electrolytic etching-staining procedure which reveals matrix, matrix grain boundaries and carbides simultaneously in high contrast. (ERA citation 05:013907)

EPRI-AF-1176 PC **A03**/MF **A01**
Pennsylvania Univ., Philadelphia. Dept. of Metallurgy and Materials Science.
Metastable Phenomena in Hydrogen Degradation of Low Carbon Alloy Steels. Interim Report, December 1977 to November 1978.
L. S. Darken, and E. R. Ryba. Sep 79, 39p

According to thermodynamic calculations, the inclusion of chromium and other strong carbide-forming elements in steels should significantly lower the activity of carbon so that methane does not form in hydrogen atmospheres at moderate temperatures. However, degradation of low alloy steels does occur, and it is suggested that a metastable equilibrium condition exists in which the carbon atoms cluster around the atoms of the alloying elements in the ferrite phase and assume a higher activity. This suggestion has now been substantiated by the results of carbonization experiments in which pure iron and iron-chromium alloys have been exposed to atmospheres of varying carbon activities at 600 exp 0 and 700 exp 0 C. Measurement of weight changes by thermogravimetry has clearly shown that the solubility of carbon in the alloy ferrite is in excess of that in pure iron. (ERA citation 05:012183)

FE-3050-T1 PC **A03**/MF **A01**
Westinghouse Research and Development Center, Pittsburgh.
Study to Optimize Cr-Mo Steels to Resist Hydrogen and Temper Embrittlement. Combined Quarterly Reports Nos. 1 and 2.
B. J. Shaw. 7 May 79, 44p
Contract ET-78-C-01-3050

The first technical report contains a complete description of the program structure and objectives. Two groups of 2-1/4 Cr-1 Mo steel will be characterized for resistance to temper and hydrogen embrittlement: (i) commercial steels provided by the API and (ii) laboratory heats with compositions arranged according to a statistical design. This design and the reasoning for the selected compositions is discussed. The test matrix includes two strength levels: that of normal ASTM A387 pressure vessel steel and that representative of the HAZ adjacent to a weldment. The characterization of the peak hardness in the HAZ is presented in this report. A brief review of the test requirements for measuring K/sub Iscc/ in H sub 2 S is also included. (ERA citation 05:012930)

GA-A-15572 PC **A04**/MF **A01**
General Atomic Co., San Diego, CA.
Creep-Rupture Behavior of 2-1/4 Cr-1 Mo Steel, Alloy 800H and Hastelloy Alloy X in a Simulated HTGR Helium Environment.
G. Y. Lai, and R. J. Wolwowicz. Dec 79, 75p
Contract AT03-76ET35300

Creep-rupture testing was conducted on 1 1/4 Cr-1 Mo steel, Alloy 800H and Hastelloy Alloy X in flowing helium containing nominal concentration of following gases: 1500 mu atm H sub 2 , 450 mu atm CO, 50 mu atm CH sub 4 , 50 mu atm H sub 2 O and 5 mu atm CO sub 2 . This environment is believed to represent maximum permissible levels of impurities in the primary coolant for the steam-cycle system of a high-temperature gas-cooled reactor (HTGR) when it is operating continuously with a water and/or steam leak at technical specification limits. Two or three heats of material for each alloy were investigated. Tests were conducted at 482 exp 0 C and 760 exp 0 C (1200 exp 0 F and 1400 exp 0 F) for Alloy 800H, and at 760 exp 0 C and 871 exp 0 C (1400 exp 0 F and 1600 exp 0 F) for Hastelloy Alloy X for times up to 10,000 h. Selected tests were performed on same heat of material in both air and helium environments to make a direct comparison of creep-rupture behaviors between two environments. Metallurgical evaluation was performed on selected post test specimens with respect to gas-metal interactions which included oxidation, carburization and/or decarburization. Correlation between gaseous corrosion and creep-rupture behavior was attempted. Limited tests were also performed to investigate the specimen size effects on creep-rupture behavior in the helium environment. (ERA citation 05:012184)

GA-A-15581 PC **A03**/MF **A01**
General Atomic Co., San Diego, CA.
Determination of Tritium Permeation Rate Through T-22 in GCFR Helium Environment.
L. Yang, and W. A. Baugh. 1980, 26p
Contract AT03-76SF71023

Measurements were made on tritium permeation rates through T-22 tubular samples in the temperature range of 300 exp 0 to 550 exp 0 C. The tritium source consists of tritium in helium containing hydrogen at 6 vol % and sufficient water vapor to maintain a hydrogen-to-water-pressure ratio of 10, the total pressure being 1.01 x 10 exp 5 Pa (1 atm). Two tritium sources at specific activities of 2.6 x 10 exp -3 and 3.1 x 10 exp -2 mu Ci/std cc, respectively, were used for determining how the permeation rate varies with tritium concentration. The T-22 tubular samples have a wall thickness of 0.437 x 10 exp -2 m (0.172 in.), and two samples are used for checking the reproducibility of the results. During the measurements, the tritium diffusing through the wall of the sample is swept out with a helium-steam mixture by bubbling helium at atmospheric pressure through a water reservoir maintained at 90 exp 0 C. (ERA citation 05:013904)

LA-8127-MS PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
Defect Formation in 800-MeV Proton-Irradiated Aluminum.
H. Jang, J. Moteff, L. Levinson, R. D. Brown, and W. V. Green. Nov 79, 15p
Contract W-7405-ENG-36

Transmission electron microscopy was used to investigate the formation of irradiation-induced defects in proton-irradiated high-purity aluminum. The specimens were irradiated by 800-MeV protons to about 0.25 displacements per atom (dpa) in the Los Alamos Meson Physics Facility (LAMPF), producing about 20 atomic ppM helium, 130 atomic ppM hydrogen, and approximately 70 atomic ppM of spallation products. The as-irradiated microstructure mainly consisted of cavities with a mean size of 88 A, number density of 1 x 10 exp 15 cavities/cm exp 3 , and volume fraction of about 0.05%. The swelling was comparable to that of high-purity aluminum samples neutron-irradiated to the same displacement level. However, the high production rate of gas atoms during the proton irradiation increased the cavity number density by an order of magnitude relative to neutron irradiation, and reduced the cavity size by a factor of about 3. A postirradiation annealing treatment at 250 exp 0 C resulted in complete disappearance of the small cavities and formaion of gas bubbles on grain boundaries. (ERA citation 05:010336)

LBL-10286 PC **A05**/MF **A01**
California Univ., Berkeley. Lawrence Berkeley Lab.
Calcium Sulfate-Induced Accelerated Corrosion.
H. C. Akuezue. Dec 79, 83p
Contract W-7405-ENG-48
Thesis.

In fluidized-bed coal combustion, dolomite or limestone is fed along with the coal to absorb the sulfur. Originally, it was incorrectly expected that the spent acceptor, CaSO sub 4 , would not give rise to corrosion problems. However, pilot experience has shown cases of extensive oxidation and sulfidation, which is presumably related to the calcium sulfate deposit. The attack of CaO/CaSO sub 4 and CaO/CaS salt mixtures (1:1) on typical fluidized-bed coal combustor materials in the temperature range 850 to 1100 exp 0 C and oxygen partial pressures in the range of 10 exp -19 to 1 atm (air) were investigated using the following test materials: pure iron, nickel and chromium, Fe-20Cr, stainless steel 310 and Incoloy 800. Also, the effects of the introduction of sulfur-containing gases, carbon as substitute for particles of unreacted coal, and NH sub 3 into the CaO/CaSO sub 4 mixture were investigated. There appear to be two aspects of CaSO sub 4 -induced attack: (a) direct attack by CaSO sub 4 at low temperatures, 950 exp 0 C and below, which does not involve sulfidation, and (b) complex calcium-iron sulfate liquid-phase attack. A model of the CaSO sub 4 -induced accelerated attack on pure iron and iron-base materials is proposed. 29 figures. (ERA citation 05:013036)

LBL-9956 PC **A07**/MF **A01**
California Univ., Berkeley. Lawrence Berkeley Lab.
Mechanism of Microstructural Change and Its Consequences in a Low Carbon Fe-6Ni Alloy.
J. Kim. Nov 79, 132p
Contract W-7405-ENG-26
Thesis.

The mechanism of microstructural changes during a three step thermomechanical treatment and the effects of resulting microstructures on mechanical properties were investigated in a low carbon Fe-6Ni alloy. Especially emphasized in this study were changes in grain size and the process of formation of the precipitated austenite. Refinement of the grain size appeared to be achieved after two step treatment. Heating by temperature cycling up to the austenite reversion temperature was found primarily to refine prior austenite grains. Controlled rolling was revealed to be an effective means to replace these thermal cyclings. (alpha + gamma) two-phase tempering showed ultrafine grains through two-phase decomposition and development of subgrains with large angle grain boundaries. A minimum of two thermal treatments in the (alpha + gamma) two-phase region appeared necessary for a formation of stable retained austenite. (ERA citation 05:012176)

N80-20397/9 PC **A07**/MF **A01**
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Chemistry.
A Fundamental Approach to Adhesion: Synthesis, Surface Analysis, Thermodynamics and Mechanics.
Final Report.
R. Siriwardane, and J. P. Wightman. Mar 80, 128p NASA-CR-162903
Grant NSG-1124

The acid-base properties of titanium 6-4 plates (low surface area) were investigated after three different pretreatments, namely Turco, phosphate-fluoride and Pasa-Jell. A series of indicators was used and color changes were detected using diffuse reflectance visible spectroscopy. Electron spectroscopy for chemical analysis was used to examine the indicator on the Ti 6-4 surface. Specular reflectance infra-red spectroscopy was used to study the adsorption of stearic acid from cyclohexane solutions on the Ti 6-4 surface.

PAT-APPL-6-128 326 PC **A02**/MF **A01**
Department of the Navy Washington DC
Method of Modifying the Transition Temperature Range of TiNi Base Shape Memory Alloys.
Patent Application,
David Goldstein, Richard E. Jones, and Robert Sery. Filed 7 Mar 80, 17p AD-D007 150/6
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A method of changing the shape change transition temperature range (TTR) of an object made from a nickel-titanium based shape change memory alloy by selection of the final annealing temperature. (Author)

PAT-APPL-6-132 453 PC **A02**/MF **A01**
Department of the Air Force Washington DC
Low Temperature Braze Alloy.
Patent Application,
Donald R. Kitchen. Filed 21 Mar 80, 19p AD-D007 120/9
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

No abstract available.

PB80-164239 PC **A02**/MF **A01**
National Bureau of Standards, Washington, DC. Diffusion in Metals Data Center.
Kinetics of Phase Transformations in the Copper-Zinc System (Kinetika Fazovykh Prevrashchenii V Sisteme Med'-Tsik),
Yu. S. Logvinenko, Yu. V. Piguzov, and K. M. Shtrokhman. 1979, 10p DMDC-20327, TT-79-58148

Trans. of Fizika i Khimiya Obrabotki Materialov (USSR) n4 p120-123 1970. Sponsored in part by National Science Foundation, Washington, DC. Special Foreign Currency Science Information Program.

The kinetics of phase transformation during isothermal diffusion in the copper-zinc system was studied using the internal friction method. In the plots of the internal friction versus temperature, after homogenizing at different durations, three peaks were found at 260, 290, and 330C. Each peak is connected with the Zener relaxation in the phases. By computing the activation energy of the relaxation process in these phases, an equation for the dependence of relaxation times on temperature was established. For the peak, at 260C, a deviation, about half the width, at the same relaxation time was found. This deviation is connected with the degree of inhomogeneity in the alloy. It has been suggested that the variation in the temperature dependence of internal friction at different times, is due to the phase transformation kinetics during isothermal diffusion.

PB80-164676 PC **A02**/MF **A01**
National Bureau of Standards, Washington, DC. Diffusion in Metals Data Center.
Effect of Alloying Elements on the Diffusion Mobility of Molybdenum, Manganese and Silicon (Vliyanie Legiruyushchikh Elementov Na Diffuzionnuyu Podvizhnost' Molibdena, Margantsa i Kremniya),
M. A. Krishtal, and A. M. Mokrova. 1979, 12p DMDC-19337, TT-79-58082
Trans. of Tula. Gosudarstvennyi Pedagogicheskii. Fizikotekhnicheskie Nauki, n1 p93-100 1967. Sponsored in part by National Science Foundation, Washington, DC. Special Foreign Currency Science Information Program.

The aim of this work was to study the effect of alloying on the diffusion parameters in multi-component systems. The diffusion of manganese, molybdenum, and silicon in iron and iron alloys was studied. The composition of the diffused couple was selected so as to compare the diffusion parameters of manganese, molybdenum, and silicon in the nonalloyed iron (couples Fe-Fe + Mn; Fe-Fe + Mo; Fe + Si-Fe) with the diffusion parameters in alloyed iron (couples Fe + Cr + Mn-Fe + Cr; Fe + Cr + Mn + Ti-Fe + Cr + Mn + Ti + Mo; Fe + Cr + Mn + Ti + Mo + Si-Fe + Cr + Mn + Ti + Mo). The concentration of every alloying element in all alloys was about 2 at .%. Electrolytic iron was used as a base for all alloys.

PB80-168073 PC **A02**/MF **A01**
National Bureau of Standards, Washington, DC. Diffusion in Metals Data Center.
On the Diffusion of Cobalt, Chromium, and Tungsten in Iron and Steel,
P. L. Gruzin. 1979, 17p TT-79-58095(A), DMDC-23001
Trans. of Problemy Metallovedeniya i Fiziki Metallov (USSR) n4 p475-485 n.d. Sponsored in part by National Science Foundation, Washington, DC. Special Foreign Currency Science Information Program.

The temperature dependence of the diffusion coefficients of cobalt, chromium, and tungsten was studied in alpha and gamma phases of technical iron and in carbon steel of eutectoid composition. The chemical composition of the investigated alloys was varied. Measurements were carried out in the temperature range 700-1250C by means of the Gruzin technique, with the use of the radioactive isotopes of chromium (51Cr), tungsten (185W), and cobalt (60Co). It should be mentioned that the isotope (185W) radiates only beta particles. Consequently, the diffusion coefficients of tungsten were calculated by taking into consideration the absorption of beta-radiation in iron and steel. The validity of the absorption formula was checked during the measurement of the diffusion coefficients of cobalt, the radioactive isotope of which simultaneously radiates beta and gamma-rays. For this purpose, an alloy of cobalt, nickel, and chromium was used, with chromium and nickel contents of about 20%. The value of D was determined for the same sample - once for beta, and another time for gamma-radiation. The results of these measurements are given in the form of several mathematical parameters.

PB80-168081 PC **A02**/MF **A01**
National Bureau of Standards, Washington, DC. Diffusion in Metals Data Center.
Influence of Carbon on the Self-Diffusion of Iron in the Iron-Nickel System,
P. L. Gruzin, and E. V. Kuznetsov. 1979, 10p TT-79-58095(B), DMDC-23002
Trans. of Problemy Metallovedeniya i Fiziki Metallov (USSR) n4 p498-502 n.d. Sponsored in part by National Science Foundation, Washington, DC. Special Foreign Currency Science Information Program.

The influence of carbon on the self-diffusion in iron and iron-nickel alloys was measured in the temperature range 1050 to 1320C using the residual radioactivity technique. Diffusivities were calculated for 59Fe and Arrhenius plots were constructed from which the appropriate diffusion parameters were calculated. A composition dependence for carbon was noted. An influence of microstructures were also reported.

PB80-170343 PC **A06**/MF **A01**
Office of Technology Assessment, Washington, DC.
Technical Options for Conservation of Metals: Case Studies of Selected Metals and Products. Volume II-A: A Preliminary Assessment of Options for Reducing Wastage of Materials.
Working paper no. 1.
Jan 78, 125p
See also Volume 2C, PB80-110935, and Volume 2B, PB80-170350. Prepared by Battelle Columbus Labs., OH.

This assessment deals with options for reducing losses of materials from the domestic materials cycle. Such losses constitute potential wastage where technically and economically feasible ways can be adopted for reducing such losses. The 1974 materials cycles for eight selected metals were studied: iron and steel, aluminum, copper, platinum group metals, manganese, chromium, nickel, and tungsten. The more significant options for reducing losses are as follows: (1) improved solid waste collection, processing, and separation of the metals component; (2) improved identification of the losses from materials cycles; (3) new emphasis on design to facilitate recovery and return to the cycle; (4) research and development on metallurgical processes; (5) substitution of more available materials in selected uses; (6) research and development on milling and concentrating--particularly fine-particle technology.

PB80-170350 PC **A10**/MF **A01**
Office of Technology Assessment, Washington, DC.
Technical Options for Conservation of Metals: Case Studies of Selected Metals and Products. Volume II-B: Flows of Selected Materials, 1974.
Working paper no. 2.
Jan 78, 211p
See also Volume 2A, PB80-170343, and Volume 2C, PB80-110935. Prepared by Battelle Columbus Labs., OH.

The first task in this assessment was to determine the materials flows for iron and steel, aluminum, copper, chromium, nickel, tungsten, platinum-group metals from their sources (ore) to end-use products. Data were collected on the flow of material in 1974 from source (country) into end-use products with as detailed a classification as was possible with available data. Information on foreign and domestic sources of minerals supply was summarized along with the amounts of secondary metals including prompt and obsolete scrap. In this first task, projections of domestic supply and demand to the year 2000 were also made. In making these longer term projections, major changes in supply technology and major changes in demand technologies were considered. This volume is an edited version of the data collection and analysis on flows of selected basic materials.

PB80-170442 PC **A04**/MF **A01**
Netherlands Energy Research Foundation ECN, Petten.
Tensile Properties of Irradiated and Fatigue Exposed Stainless Steel DIN X 6 CrNi 1811 (Similar to AISI Type 304) Plate and Welded Joints,
M. I. de Vries, B. v.d. Schaaf, and J. D. Elen. Oct 79, 54p ECN-73

Test specimens have been irradiated at 723K and 823K up to fluences of 1.10 to the 23rd power.m to the minus 2 power and 5.10 to the 24th power n. 1/sq m (E>0.1 MeV). These are representative conditions for the SNR-300 reactor vessel and inner components after 16 years of operation. High-rate tensile tests were performed after fatigue exposure up to various fractions of fatigue life (D) ranging from 5% to 95%. Fatigue tests were performed in air under total axial strain control with a strain range of 0.6% at constant strain rate of 3.10 to the minus 3 power 1/s. After fatigue exposure to more than 70% of fatigue life (D>0.7), tensile properties rapidly deteriorated. Irradiation did not significantly affect the tensile properties after fatigue exposure. However, irradiation can cause the appearance of large fatigue cracks after a smaller number of cycles than in the case of unirradiated material, thus affecting the N-value at which the tensile properties deteriorate. Weld defects have a similar effect.

PB80-170475 PC **A06**/MF **A01**
Netherlands Energy Research Foundation ECN, Petten.
Effect of Neutron Irradiation on Sequential Creep-Fatigue Interaction of 18Cr-11Ni (DIN 1.4948) Stainless Steel Plate and Welded Joints at 823 K,
B. v.d. Schaaf, M. I. de Vries, and J. D. Elen. Oct 79, 102p ECN-74

Neutron fluence amounted to 10 to the 23rd power n.1/sq m (E>0.1 MeV). Creep exposures lasted up to 4100 h. Low cycle fatigue testing was carried out with a total strain range of 0.6% and a strain rate of 3* 1/1000/s. The data are required for design and safety analysis of permanent structures such as: reactor vessel and shield tank of the fast breeder reactor SNR-300. With increasing creep damage prior to fatigue the number of fatigue cycles to failure is decreasing. For parent metal the fatigue fraction of 0.5 is not exceeded, due to the early initiation of fatigue cracks at intergranular creep cracks. The creep cracks serving as starter cracks for fatigue in welds are formed in or near the root bead. With increasing fatigue damage prior to creep the times to rupture are increasing up to fatigue fractions of 0.5. After higher fatigue fractions the times to rupture rapidly decrease. In the irradiated condition the creep stresses needed to accumulate a certain amount of creep damage in a certain time are 50 MPa lower than in the unirradiated condition. For welded joints the amount is 30 MPa. Creep ductility after irradiation is decreased by a factor 5.

PB80-809981 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Cathodic Protection. 1964-March, 1980 (Citations from the NTIS Data Base).
Rept. for 1964-Mar 80,
William E. Reed. May 80, 221p
Supersedes NTIS/PS-79/0498 and NTIS/PS-78/0466. For the companion Published Searches of the Engineering Index Data Base, see NTIS/PS-76/0341, NTIS/PS-78/0467, and PB80-809999.

Cathodic protection of ships, moorings, nuclear reactors, underground pipes, underwater equipment, and steel reinforcement are presented in these abstracts of Federally-funded research. The research covers electrochemistry, electrode cleaning, method reliability, and electron microscopy. (This updated bibliography contains 214 abstracts, 14 of which are new entries to the previous edition.)

PB80-809999 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Cathodic Protection. 1977-March, 1980 (Citations from the Engineering Index Data Base).
Rept. for 1977-Mar 80,
William E. Reed. May 80, 244p
Supersedes NTIS/PS-79/0499 and NTIS/PS-78/0468. For the companion Published Search of the NTIS Data Base, see PB80-809981. See also 1970-1973, NTIS/PS-76/0341 and 1974-1976, NTIS/PS-78/0467.

Worldwide journal research is cited on cathodic protection of ships, underground pipelines and cables, offshore structures, nuclear power plants,

and reinforced concretes. Design and installation of these systems are discussed. Equipment and performance of cathodic systems are covered. Combined cathodic protection and coating systems are described. (This updated bibliography contains 237 abstracts, 59 of which are new entries to the previous edition.)

PB80-810005 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Chemical Analysis of Steel. 1964-April, 1980 (Citations from the NTIS Data Base).
Rept. for 1964-Apr 80,
Diane M. Cavagnaro. May 80, 247p
Supersedes NTIS/PS-79/0479 and NTIS/PS-78/0491.

Information is cited on chemical analysis of boron, nitrogen, hydrogen, sulfur, silicon, carbon, oxygen, aluminum, rare earths, and other trace elements in steel. In addition, research on the determination of major elements, including iron, is covered. New techniques and refinement of older techniques, including x-ray fluorescence, spectroscopy, chromatography, activation analysis, and wet chemical methods are also included. (This updated bibliography contains 240 abstracts, 14 of which are new entries to the previous edition.)

PB80-810013 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Pipeline Corrosion. 1964-April, 1980 (Citations from the NTIS Data Base).
Rept. for 1964-Apr 80,
William E. Reed. May 80, 221p
Supersedes NTIS/PS-79/0496 and NTIS/PS-78/0453. For the companion Published Searches of the Engineering Index Data Base, see NTIS/PS-78/0454 and PB80-810021.

Federally-sponsored research on pipeline corrosion in soils, sea water, and fresh water are covered. Studies include pipeline systems containing natural gas, petroleum, slurries, water, and volatile or corrosive liquids. Materials for pipelines are discussed as well as inhibitors for pipeline systems. Coatings, linings, welding, and testing are described as they relate to corrosion. (This updated bibliography contains 214 abstracts, 69 of which are new entries to the previous edition.)

PB80-810021 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Pipeline Corrosion. 1977-April, 1980 (Citations from the Engineering Index Data Base).
Rept. for 1977-Apr 80,
William E. Reed. May 80, 243p
Supersedes NTIS/PS-79/0497 and NTIS/PS-78/0455. For the companion Published Search of the NTIS Data Base, see PB80-810013. See also 1975-1976, NTIS/PS-78/0454.

Worldwide research is cited on corrosion and corrosion prevention of pipelines for natural gas, petroleum, water, slurries, and other gases and liquids. Pipes of steel, stainless steel, copper alloys, galvanized steel, concrete, and zinc alloys are the major materials studied. Prevention of corrosion by cathodic protection, coatings, wrappings, and linings are covered. The use of plastics for corrosion resistant pipes is included. (This bibliography contains 236 abstracts, 12 of which are new entries to the previous edition.)

PNL-SA-7229 PC **A02**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Phase Stability of Amorphous Intermetallic Alloys.
R. Wang. 1979, 4p CONF-790219-14
Contract EY-76-C-06-1830
AIME annual meeting, New Orleans, LA, USA, 18 Feb 1979.

Phase stability of amorphous intermetallic alloys, in terms of both formation and thermal stability, can be related to the alloy chemistry of the crystalline counterpart: the intermetallic compounds. The formation of the amorphous alloys is generally favored by the composition range in which the complex-structured intermetallic compounds and nearby eutectic point are present. The relative thermal stability of the amorphous intermetallic alloys, expressed by the reduced crystallization temperature, T/sub rc/, (T/sub rc/ = T/sub c/T/sub m/, where T/sub c/ is the crystallization temperature exp 0 K, and T/sub m/ the melting temperature of the crystallized phase exp 0 K) increases with the increasing of the structural complexity of the crystalline counterparts. Based on recent data of amorphous intertransiton metal alloys, T/sub rc/ increases rapidly from less than 0.1 for the simple structures of bcc, fcc, or hcp, to nearly 0.4 for more complex structures such as A15, Laves-, sigma- and CaCu sub 5 -phases up to 0.6 for highly complex structures of eta-, delta-, and mu -phases. It can therefore be argued that alloy principles for the equilibrium compounds can be applied to the phase stability of the amorphous intermetallic alloys. (ERA citation 05:012177)

SAN-1257-T1 PC **A04**/MF **A01**
Kaiser Aluminium and Chemical Corp., Pleasanton, CA.
Energy Savings Through the Use of an Improved Aluminum Reduction Cell Cathode. 1978 Annual Report.
J. R. Payne, and R. C. Dorward. May 79, 68p
Contract EC-76-C-03-1257

Research which could result in a significant reduction in the energy required to produce aluminum is reported. The objectives of the program were to develop specifications for TiB sub 2 materials that have an acceptable life in an aluminum reduction cell; to develop cathode designs that can accommodate the inherent properties of the material; and to evaluate the process economics of an industrial retrofit. The materials evaluation program has established relationships between microstructure (grain size, porosity, etc.) and mechanical properties, and has distinguished those characteristics that promote intergranular disintegration in a reduction cell. Methods have also been developed to inspect and detect defective material by nondestructive means. Heat transfer theory and experiments have been applied to the thermal shock problems. From this work it is concluded that: the primary failure mechanism observed in previous work no longer applies to dense TiB sub 2 parts that contain no grain boundary phases; thermal shock can be avoided by attention to TiB sub 2 shape design and heat up technique; and slow crack growth caused previous cell failures; and more cell testing is recommended. (ERA citation 05:013791)

SAND-79-1717C PC **A02**/MF **A01**
Sandia Labs., Albuquerque, NM.
Thermal Expansion of Nickel to 2300 exp 0 K.
W. D. Drotning. 1979, 20p CONF-791134-5
Contract EY-76-C-04-0789
16. international thermal conductivity conference, Chicago, IL, USA, 7 Nov 1979.

The thermal expansion of nickel was measured from ambient to 2300 exp 0 K using the gamma attenuation technique. The high temperature measurement system uses a high-vacuum tungsten mesh furnace designed for passage of a collimated gamma beam through the sample region. The gamma counting system incorporates a thermostatically-controlled detector and automatic gain control to achieve count rate stability. A precision analysis is given for the use of the technique to measure changes in molten density as a function of temperature, and a discussion of possible systematic errors in the use of the measurement technique is presented. The linear thermal expansion of solid nickel from ambient to the melting point (1728 exp 0 K) was observed to be slightly larger than provisional values suggested in the literature. The thermal expansion of molten nickel was measured from melt to 2300 exp 0 K. The volumetric expansion coefficient was found to be -(7.35 +- 0.09) x 10 exp -4 g/cm exp 3 exp 0 K over this temperature range, which is compared with measurements by previous investigations which range from -6.4 to -12.1 x 10 exp -4 g/cm exp 3 exp 0 K. (ERA citation 05:012188)

UCRL-15158 PC **A02**/MF **A01**
Airco, Inc., Murray Hill, NJ. Central Research Labs.
Final Report on Work Done under LLL P.O. No. 3964609.
C. Spencer. 21 Sep 79, 9p
Contract W-7405-ENG-48

In comparing the results of extrusions of Nb, it was found that the non-uniformity of the Nb extruded at Teledyne Wah Chang Albany (TWCA) is more severe than the other. This correlates with results of the mechanical properties of Nb. Both specimens were given identical extrusion, cold work, and heat treatments. (ERA citation 05:013893)

UCRL-50058-79-3 PC **A04**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Advances in Materials Science, Metals and Ceramics Division. Quarterly Progress Report, July-September 1979.
J. J. Truhan, and F. N. Weld. 25 Oct 79, 64p
Contract W-7405-ENG-48

Research is reported on materials for magnetic fusion energy, laser fusion energy, Al-air batteries, geothermal energy, oil shale, nuclear waste management, thermochemical cycles for hydrogen production, chemistry, and basic energy science. (ERA citation 05:013900)

UCRL-52828 PC **A02**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Electrical Discharge in Gases: A Technique for Detecting Metal Anomalies.
D. E. Lord. 6 Jun 79, 23p
Contract W-7405-ENG-48

Optical ionization effects in gases appear to be very sensitive indicators of nonuniformities caused by contamination, deformation, and other factors affecting a metal surface. These optical effects are influenced by surface electron emission, which is influenced in turn by the chemical, metallurgical, and mechanical condition of the metal surface. Based on these effects, a general technique for inspection of critical parts that is fast, inexpensive, nondestructive, and not limited by size or geometry is presented. Ionization effects that reveal nonuniformities and were recorded with standard photographic equipment are shown. (ERA citation 05:012189)

11H. Oils, Lubricants, and Hydraulic Fluids

AD-A082 919/2 PC **A04**/MF **A01**
Naval Air Propulsion Center Trenton NJ Propulsion Technology and Project Engineering Dept
Development of the Full Scale T63 Test for Specification MIL-L-23699 and XAS-2354 Gas Turbine Lubricants.
Final rept.,
John T. Shimski. Feb 80, 71p Rept no. NAPC-PE-31

The T56 engine had been utilized for the full scale engine test required under the qualification process for lubricants Specifications MIL-L-23699 and XAS-2354. As advanced engine operating environments become more severe, and the quality of new lubricants improved, the T56 engine became marginal in its ability to thoroughly test gas turbine lubricants. As a result, a new engine was selected through an evaluation of engines in service. The T63-A-5A engine was chosen because of its present level of severity on the turbine section tube wetted parts and its potential for increased severity testing through engine/lube system modification. This report presents the results of engine modifications and operating procedures developed in establishing the T63 engine test for gas turbine lube oil qualification. (Author)

N80-20588/3 PC **A05**/MF **A01**
Georgia Inst. of Tech., Atlanta.
Surface Temperatures and Glassy State Investigations in Tribology, Part 3.
Final Report.
S. S. Bair, and W. O. Winer. Apr 80, 85p NASA-CR-3272

Research related to the development of the limiting shear stress rheological model is reported. Techniques were developed for subjecting lubricants to isothermal compression in order to obtain relevant determinations of the limiting shear stress and elastic shear modulus. The isothermal com-

pression limiting shear stress was found to predict very well the maximum traction for a given lubricant. Small amounts of side slip and twist incorporated in the model were shown to have great influence on the rising portion of the traction curve at low slide-roll ratio. The shear rheological model was also applied to a Grubin-like elastohydrodynamic inlet analysis for predicting film thicknesses when employing the limiting shear stress model material behavior.

11I. Plastics

AD-A082 544/8 PC **A02**/MF **A01**
Massachusetts Univ Amherst Dept of Chemistry
Synthesis and Characterization of High Energy Polymers.
Final rept. 1 Mar 79-31 Mar 80,
James C. W. Chien, and C. Peter Lillya. 31 Mar 80, 15p
Contract N00014-79-C-0265

Synthetic procedures for selective nitromercuration via phase transfer catalysis have been developed for usage with water insoluble poly(butadiene), poly(isoprene), and carboxyl terminated butadiene acrylonitrile copolymers. (Author)

AD-A082 691/7 PC **A02**/MF **A01**
Army Materials and Mechanics Research Center Watertown MA
X-Ray Investigation of Ballistic Yarns.
Final rept.,
C. Richard Desper. Dec 79, 18p Rept no. AMMRC-TR-79-62

A series of ballistic polyamide yarns, comprising 12 Kevlar samples and one Nylon 66 sample, were examined by X-ray diffraction. The nine Kevlar 29 and three Kevlar 49 yarns were identified by their lattice parameters as poly(p-phenyleneterephthalamide) rather than poly(p-benzamide). The normalized equatorial scans show a somewhat greater crystallite size or perfection for the Kevlar 49 samples compared to the Kevlar 29 samples. The equatorial scan of the Nylon 66 sample yielded a Crystal Perfection Index of 72 percent. Orientation functions in the range 0.95 to 0.97 were measured for the Kevlar samples, while the corresponding value for the Nylon 66 sample was 0.881. (Author)

AD-A082 721/2 Not available NTIS
Australian Defence Scientific Service Melbourne
Fire Hazards of Organic Materials--Small Scale Assessment of Flammability and Smoke Generation,
J. R. Brown, and P. Dunn. 29 Oct 75, 7p
Availability: Pub. in Fire and Materials, v1 p2-8 1976 (No copies furnished by DTIC).

No abstract available.

AD-A082 722/0 Not available NTIS
Materials Research Labs Ascot Vale (Australia)
Gamma-Radiation-Induced Grafting of Methyl Methacrylate to Polypropylene: The Effects of Water and Mineral Acid,
D. M. Pinkerton, and R. H. Stacewicz. 13 Jan 76, 5p
Availability: Pub. in Polymer Letters Edition, v14 p287-291 1976 (No copies furnished by DTIC).

No abstract available.

AD-A082 742/8 PC **A02**/MF **A01**
Air Force Packaging Evaluation Agency Wright-Patterson AFB OH
Evaluation of Polyimide Flexible Foam,
W. Paul Robbins. Mar 80, 10p Rept no. PTPT-80-6

A 0.5 pcf polyimide flexible foam developed by Solar Turbines International, Division of International Harvester Corp., was evaluated for cushioning and flammability characteristics. The results showed that the dynamic cushioning characteristics were equivalent to 0.5 polyurethane foam at 72 degrees F, superior at -40 degrees F and the foam has improved reuseability. When exposed to a flame of a bunsen burner the polyimide foam was considered non-burning, with little smoke emission or odor. (Author)

AD-A082 784/0 Not available NTIS
Royal Military Coll of Canada Kingston (Ontario)
An Investigation of the Pore Structure and Molecular Sieve Properties of Polyvinylidene Chloride Carbons,
Stuart S. Barton, Michael J. B. Evans, and Brian H. Harrison. 31 Mar 74, 8p
Availability: Pub. in Jnl. of Colloid and Interface Science, v49 n3 p462-468 Dec 74 (No copies furnished by DTIC).

No abstract available.

AD-A083 002/6 PC **A02**/MF **A01**
Pennwalt Corp King of Prussia PA Central Research and Development Dept
Piezoelectric Polymers.
Final rept. 1 Jan 77-31 Dec 79,
Harry Stefanou. Apr 80, 10p
Contract N00014-77-C-0130

The objective of this program was the development of improved fluoropolymer resins for transducer applications. The effort involved synthesis, characterization, and processing of new resins with emphasis on those obtained by copolymerizing vinylidene fluoride (VF2) with monomers such as tetrafluoroethylene (TFE), vinyl fluoride (VF), trifluoroethylene (VF3), and hexafluoropropene (HFP). Variations on the PVF2 homopolymer synthesis were also investigated. In a number of cases the piezoelectric activity of the copolymers was found to be as good or better than that of the PVF2 homopolymer; however, a distinct advantage of the copolymer vs homopolymer is the fact that, in general, the copolymers are considerably easier to fabricate into thick, oriented film configurations, as needed for underwater use. (Author)

AD-A083 013/3 PC **A02**/MF **A01**
Channel Products Inc Chesterland OH
Development of Specialized Equipment to Measure Piezoelectric Coefficients of Polymer Piezoelectric Materials,
C. P. Germano. 22 Feb 80, 22p
Contract N00014-78-C-0383

Specialized equipment has been developed to measure piezoelectric g and d coefficients of polymer piezoelectric materials. It is likely that the same equipment will allow the evaluation of these properties for composite flexible lead titanate zirconates as well. However; samples of these were not made available and thus not tested. By means of a special adaptor, the same equipment may be used as a standard Berlincourt d(33) Meter Channel Prod. Model Number CPDT 3300.

PAT-APPL-6-117 162 PC **A02**/MF **A01**
Department of the Navy Washington DC
Electrically Conductive Polymeric Compositions.
Patent Application,
Robert B. Fox, and Oh-Kil Kim. Filed 31 Jan 80, 13p AD-D007 143/1
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

Electrically conductive polymeric compositions are obtained by incorporating crown ether complexes of TCNQ salts in a polymer selected from the class consisting of polycarbonates and poly(alkyl alkacrylates. The compositions can be formed into semiconductive films useful in the fabrication of e.g., thermoresistors and electronic devices. (Author)

PB80-166283 PC **E02**/MF **E02**
Fire Research Station, Borehamwood, (England).
The Ignition and Burning Characteristics of Fabric Covered Foams.
Current papers,
W. D. Woolley, S. A. Ames, A. I. Pitt, and K. Buckland. c1978, 24p CP-30/78

The report describes a series of experiments carried out to study the ignition and burning characteristics of a range of upholstery foams covered with various fabrics (and interlinings) as appropriate to both domestic and contract use. The results are given of the performance of these fabric-foam combinations when combined as cushion slabs to form a 'mock-up' chair and subjected to an ignition source (sufficiently large to cause ignition) in the room of a full-scale room corridor test facility. Measurements are given of the general burning characteristics including the temperatures inside the room, the volume of the smoke, and the production of certain toxic gases. Some general advice is given about the utilization of the smoke measurements for calculating the approximate visibility which will be attained in compartments of known volume. The results should be of value to designers, purchasing and control officers and others in the selection of material combinations to achieve certain performance criteria. (Copyright (c) British Crown Copyright 1978.)

UCRL-82862 PC **A02**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Stress-Rupture Lifetimes of Organic Fiber-Epoxy Strands and Pressure Vessels.
H. T. Hahn, I. L. Chiu, and T. L. Gates. 21 Aug 79, 25p CONF-800203-1
Contract W-7405-ENG-48
35. annual conference of the SPI reinforced plastics/composites institute, New Orleans, LA, USA, 4 Feb 1980.

Long-term behavior of filament-wound pressure vessels were tested, Kevlar 49 epoxy strands were studied in stress-rupture for more than a year. Because the strands are the smallest structural unit in filament winding, their behavior directly controls the performance of vessels. Five different stress levels were studied: 86, 80, 74, 68, and 50% of the mean ultimate tensile strength (UTS). At each stress level, approximately one-hundred strands were hung in a room maintained at 22 to 24 exp 0 C and below 20% relative humidity. Failure times were automatically recorded by a data acquisition system. Lifetimes were analyzed statistically using a two-parameter Weibull distribution. The maximum-likelihood method was used to estimate the parameters. The shape parameter, which is a measure of scatter and failure-rate change, increased with decreasing stress level. Less scatter and increasing failure rates were observed at lower stresses. There was no sign of an endurance limit down to 68% UTS. At 50% UTS no failure had yet occurred after 9000 h. The strand data were compared with data on lifetimes of pressure vessels wound with the same fiber and epoxy. The strands had slightly longer characteristic lifetimes, except at 86% UTS, and slightly less scatter, except at 68% UTS. The results of this study indicate that strands can provide valuable information about the long-term performance of filament-wound pressure vessels. (ERA citation 05:012210)

11J. Rubbers

AD-A082 625/5 PC **A02**/MF **A01**
Cooper Labs Inc Cedar Knolls NJ
Environmental Stability Testing of a Coated, Elastomeric Dental Ribbon.
Rept. no. 2 (Final) Oct 78-Sep 79,
Gary J. Shemaka, and William W. Tenero. Sep 79, 25p
Contract DAMD17-78-C-8084

A coated, elastomeric dental ribbon developed by Dr. Paul Jaffe with Cooper Laboratories was taken through a series of physical tests at various environmental conditions to determine its suitability for military application. Tensile properties and Tensile Impact Strengths were determined at -40, 0, 73 and 120 Fahrenheit. Yield Strengths were 3730, 2170, 1130 and 1100 (p.s.i.) respectively. Break Strengths were 4150, 5030, 5260 and > 4500 (p.s.i.) respectively. Percent Elongations at breakage were 540, 640, 600 and > 700 (percent) respectively. The dental tape was placed in circulating air ovens at room temperature as a control, at 160 F with 90% relative humidity, at 194 F and 230 F for six and twelve weeks. After exposure, the specimens were removed and allowed to condition for a minimum of 40 hours at 73 F with 50% relative humidity. They were again tested for Tensile properties and Tensile Impact Strength. The Yield Strengths were 1130, 1630, 1830, 1380, 1390 and 2200 (p.s.i.) respectively. The Break Strengths were 5260, 4930, 3910, 2300, 1660 and 2700 (p.s.i.) respectively. No blocking was observed at -60, 73 and 160 F for a maximum of one month duration at 0.5 p.s.i. pressure. Little dimensional changes were noted at 160 F with 90% relative humidity, 194 F and 230 F, up to twelve weeks.

Samples exposed at 266 F for six weeks were too brittle to be tested.

PB80-164650 PC **A04**/MF **A01**
National Bureau of Standards, Washington, DC.
Physical Testing of Polymers for Use in Circulatory Assist Devices.
Annual rept. no. 2,
Robert W. Penn, Gregory B. McKenna, and Freddy A. Khoury. Mar 80, 63p NBSIR-80-2008
Sponsored in part by National Heart, Lung, and Blood Inst., Bethesda, MD. Devices and Technology Branch.See also PB80-101546.

The mechanical durability of an elastomer is a critical factor in its suitability for blood pump applications. In such applications, an elastomeric bladder is expected to undergo cyclic stress or strain histories at a frequency of approximately 1 Hz for periods of several years. Test methodologies for characterizing the mechanical durability of such materials do not exist. In this report, the authors describe a test methodology which we have developed for the characterization of the durability of elastomers which are candidate materials for blood pump applications. The cumulative damage framework suggests that the testing protocol be designed to examine four aspects of material failure: (1) failure under static loads, (2) failure under dynamic loads, (3) frequency dependence of dynamic failure, (4) statistics of failure. The authors report on the results to date on the uniaxial and equibiaxial failure of the blood pump elastomers using a testing protocol which includes the above four points.

PB80-168578 PC **A07**/MF **A01**
Engineers Testing Labs., Inc., Phoenix, AZ.
Chemical and Physical Properties of Asphalt-Rubber. Phase II. Product Specifications and Test Procedures.
Final rept.,
R. D. Pavlovich, T. S. Shuler, and J. C. Rosner. Nov 79, 148p FHWA/AZ-79/121
See also PB-272 685.

Asphalt-rubber was tested with conventional and non-conventional methods to begin development of testing methods for specification purposes and to find methods for studying the reaction between asphalt and reclaimed crumb rubber. A single asphalt-rubber formulation consisting of 75 percent AR-1000 asphalt and 25 percent crumb rubber from automobile tire treads (sized from No. 16 to No. 25) was used. Dependent variables included ring and ball softening point, absolute viscosity by capillary viscometer at 140 F (60 C), ductility and force-ductility at 39.2 F (4 C), elastic rebound, and low temperature viscosity with the Schweyer rheometer at 39.2 F (4 C). Recommendations are made for new tests, modifications of conventional tests and improved laboratory mixing and formulation techniques.

11L. Wood and Paper Products

PB80-176670 PC **A02**
Oregon State Univ., Corvallis. Sea Grant Coll. Program.
In Large Timbers Fumigants Stop Rot That Good Design Could Have Prevented.
Robert D. Graham. 1979, 8p ORESU-R-79-018, NOAA-80032108
Pub. in Forest Products Jnl., v29 n9 p21-27 Sep 79.

Failure to shelter wood from weather, to avoid joints that trap water, or to use preservative-treated wood--all preventable by good design--continue to create conditions favoring decay, which impairs the serviceability of wood structures. Seasoning checks that trap water are the most serious, and probably least understood, threat to the performance of timbers. Internal rot can be stopped by placing volatile chemicals in holes that are drilled in the timbers and plugged. The gases diffuse throughout the wood, eliminating decay fungi and insects for about 2.5 m from the treating site. Vapors of some chemicals were present 8 years after application so retreating cycles are expected to exceed 10 years.

12. MATHEMATICAL SCIENCES

12A. Mathematics and Statistics

AD-A082 434/2 PC **A07**/MF **A01**
Ohio State Univ Research Foundation Columbus
Finite State Models of Manned Systems: Validation, Simplification, and Extension.
Annual rept. 1 Oct 78-30 Sep 79,
Richard A. Miller. Nov 79, 136p AFOSR-TR-80-0216
Grant AFOSR-79-0015

Three basic research objectives were pursued. An assessment of the robustness and validity of previously developed discrete control models resulted in a comprehensive examination of the conceptual and methodological issues associated with validity. This work is included in the report. Work on computer assisted discrete control analysis focused primarily on the problems associated with representing continuous data in a form suitable for use by existing analysis routines. Additional work on modelling discrete control tasks, including modelling coordination in small trams was also performed and resulted in two papers which are included as appendices to the report. (Author)

AD-A082 452/4 PC **A07**/MF **A01**
Texas Univ At Austin
Approximation and Numerical Analysis of Nonlinear Equations of Evolution.
Final rept. 1 Feb 77-15 May 80,
J. T. Oden. 31 Jan 80, 146p ARO-14505.12-M
Grant DAAG29-77-G-0087

Important results were obtained in four areas: (1) Existence theorems, approximation theorems, a priori error estimates, numerical schemes, and finally computer codes were developed for the analysis of one-and two-dimensional, one- and two-phase Stefan problems characterized by variational inequalities; (2) Existence theorems, uniqueness theorems, theorems on the stability and asymptotic stability of solutions, and regularity of solutions were developed for a large class of nonlinear, convective diffusion problems characterized by pseudo-monotone operators; (3) A priori error estimates for Galerkin and Faedo-Galerkin approximations (defined, in general, by finite element methods) were established for nonlinear convection diffusion problems involving general pseudo-monotone operators; and (4) Existence theorems were obtained for a large class of nonlinear, degenerate evolution equations with solutions involving free boundaries. Applications to porous media and two-phase Stephan problems were completed. (Author)

AD-A082 482/1 PC **A02**/MF **A01**
Southern Illinois Univ Carbondale Dept of Mathematics
Local Conditioning of Parametric Forms Used to Approximate Continuous Functions,
David W. Kammler, and Robert J. McGlinn. 1979, 6p AFOSR-TR-80-0119
Grant AFOSR-74-2653
Pub. in American Mathematical Monthly, v86 n10 p841-845 Dec 79.

No abstract available.

AD-A082 484/7 PC **A03**/MF **A01**
Brown Univ Providence RI Div of Applied Mathematics
Approximation of Nonlinear Functional Differential Equation Control Systems,
H. T. Banks. 1979, 27p AFOSR-TR-80-0132
Grants AFOSR-76-3092, NSF-GP-28931
Pub. in Jnl. of Optimization Theory and Applications, v29 n3 p383-408 Nov 79.

No abstract available.

AD-A082 486/2 PC **A02**/MF **A01**
California Univ Santa Barbara Inst for Algebra and Combinatorics
Principal Minors of Complex Symmetric and Skew Matrices,
Robert C. Thompson. 10 Jul 78, 8p AFOSR-TR-80-0149
Grant AFOSR-77-3166
Pub. in Linear Algebra and its Applications, v28 p249-255 1979.

No abstract available.

AD-A082 496/1 PC **A03**/MF **A01**
California Univ Santa Barbara Inst for Algebra and Combinatorics
Singular Values and Diagonal Elements of Complex Symmetric Matrices,
Robert C. Thompson. 19 Jul 78, 43p AFOSR-TR-80-0147
Grant AFOSR-77-3166
Pub. in Linear Algebra and its Applications, v26 n65 p65-106 1979.

No abstract available.

AD-A082 497/9 PC **A02**/MF **A01**
California Univ Santa Barbara Inst for Algebra and Combinatorics
The Case of Equality in the Matrix-Valued Triangle Inequality,
Robert C. Thompson. 6 Sep 78, 3p AFOSR-TR-80-0148
Grant AFOSR-77-3166
Pub. in Pacific Jnl. of Mathematics, v82 n1 p279-280 1979.

No abstract available.

AD-A082 603/2 PC **A02**/MF **A01**
California Univ San Diego La Jolla Dept of Mathematics
Some Limit Theorems for Partial Sums of Quadratic Forms in Stationary Gaussian Variables,
M. Rosenblatt. 30 Aug 78, 9p
Contract N00014-75-C-0428
Pub.in Zeitschrift fuer Wahrscheinlichkeitstheorie und verwandte Gebiete, v49 p125-132 1979.

No abstract available.

AD-A082 605/7 PC **A02**/MF **A01**
California Univ San Diego La Jolla Dept of Mathematics
Some Limit Theorems for Partial Sums of Stationary Sequences,
M. Rosenblatt. 1980, 11p
Contract N00014-75-C-0428
Pub. in Multivariate Analysis-V, p239-248 1980.

No abstract available.

AD-A082 624/8 PC **A02**/MF **A01**
Rockwell International Thousand Oaks CA Science Center
Extreme Value Distributions.
Technical rept. 1 Feb-30 Jun 79,
Nancy R. Mann, and Nozer D. Singpurwalla. Feb 80, 23p Rept no. SC5065.4TR
Contract N00014-76-C-0723
Prepared in cooperation with George Washington Univ., Washington, DC. Dept. of Operations Research.

This is an expository survey of the (univariate) theory of extreme values and the estimation of the parameters of the related extreme-value distributions. This survey was written at the invitation of Professors N.L. Johnson and S. Kotz, editors of the forthcoming 'Encyclopedia of Statistical Sciences' to be published by John Wiley and Sons, Inc., New York. The theory of extreme values plays a fundamental role in several areas of applied statistics, such as the analysis of flood flows, the reliability of complex systems, the analysis of air pollution data, etc. In addition to surveying (without proofs) the basic results of extreme value theory and the estimators of the parameters of the extreme value distributions, this survey presents a brief discussion of the current research in these areas. (Author)

AD-A082 633/9 PC **A02**/MF **A01**
Texas Univ At Arlington Dept of Mathematics
Properties of Differential Equations through Different Measures.
Final rept. 1 Jan 77-31 Dec 79,
V. Lakshmikantham. Mar 80, 8p ARO-13881.17-M
Grant DAAG29-77-G-0062

Research is briefly summarized which addressed essentially eight areas of research: (1) reaction-diffusion equations; (2) quasi-solutions and large scale systems; (3) monotone iterative techniques;

(4) Hopf bifurcation; (5) basic theory of differential equations in Banach spaces; (6) Sobolev type differential and integral equations; (7) stochastic differential equations; and (8) differential equations with infinite delay. (Author)

AD-A082 679/2 PC **A02**/MF **A01**
Texas Univ At Austin Dept of Electrical Engineering
Risk Estimation for Nonparametric Discrimination and Estimation Rules: A Simulation Study,
C. S. Penrod, and T. J. Wagner. 27 Dec 78, 9p
AFOSR-TR-80-0128
Contract F49620-77-C-0101, Grant AFOSR-77-3385
Pub. in IEEE Transactions on Information Theory, vIT-25 n6 p753-758 Nov 79.

No abstract available.

AD-A082 692/5 PC **A02**/MF **A01**
Naval Surface Weapons Center Dahlgren VA
The KS Method in Light of Generalized Euler Parameters.
Final rept.,
R. N. DeWitt. Jan 80, 25p Rept no. NSWC/TR-79-434

The equation of motion for the restricted two-body problem is transformed via the Kustaanheimo-Stiefel transformation method (KS) into a dynamical equation in the standard four-space representation. Pure rotations about an arbitrary axis are introduced using the Euler parameters which are then generalized to include dilations. Kinematic equations in the generalized Euler representation are compared to the dynamical equations of the KS representation giving a simple interpretation of the latter. (Author)

AD-A082 718/8 Not available NTIS
Shape Technical Center the Hague (Netherlands)
The Reduction of Undamped Oscillations with Relay Controls.
Professional paper,
G. M. Coupe. 23 Apr 76, 5p
Availability: Pub. in IEEE Transactions on Automatic Control, p118-119 Feb 77 (No copies furnished by DTIC).

No abstract available.

AD-A082 729/5 PC **A05**/MF **A01**
National Aeronautical Establishment Ottawa (Ontario)
Application of the Method of Lines to the Solution of Elliptic Partial Differential Equations (Application de La Methode des Lignes a la Resolution D'equations Differentiales Partielles Elliptiques).
Aeronautical rept.,
D. J. Jones, and J. C. South, Jr. Nov 79, 81p
NAE-LR-599, NRC-18021
Summary in French.

The method of lines is used in this report for solving one linear, two nonlinear elliptic boundary value problems and a linear eigenvalue problem. An analysis of the stability and convergence is made in the linear cases. (Author)

AD-A082 771/7 PC **A03**/MF **A01**
Desmatics Inc State College PA
First-Order 'Interruptable' Designs.
Technical rept.,
Dennis E. Smith, and Denise D. Schmoyer. Apr 80, 35p Rept no. TR-106-8
Contract N00014-75-C-1054

Even a well-designed experiment interrupted before its intended completion may prove inefficient, posing serious data analysis problems and leaving important questions unanswered. This report addresses the construction of 'interruptable' designs for those cases where a first-order model is assumed and factors at only two levels are considered. The maximum absolute value (X'X) criterion was used in developing 'interruptable' designs for two different design strategies which attempt to limit the information lost if an experiment is prematurely ended. The resulting designs for four to nine factors are evaluated and selection of an 'interruptable' design is discussed. (Author)

AD-A082 849/1 PC **A03**/MF **A01**
Princeton Univ NJ Dept of Statistics
The Interpretations and Applications of the Index of Redundancy and the Redundancy Transformations.
Technical rept.,
David E. Tyler. Jan 80, 30p Rept no. TR-161-SER-2
Contracts N00014-67-A-0151-0017, N00014-75-C-0453
Sponsored in part by Grant DAHC04-74-G-0178.

The index of redundancy has been receiving increasing attention in disciplines which employ applied multivariate techniques, particularly psychology and education. This index purports to measure the degree to which one random vector can predict another random vector. In this paper attention is focused on present applications and interpretations of the index of redundancy, and relationship between the index and other multivariate techniques. Also, simultaneous transformations of the two random vectors, which differ from the standard canonical transformations, are derived and motivated. These simultaneous transformations are shown to be naturally related to the index of redundancy. (Author)

AD-A082 852/5 PC **A02**/MF **A01**
Stanford Univ CA Dept of Statistics
A Sequential Confidence Interval for the Odds Ratio.
Technical rept.,
D. Siegmund. 2 Feb 80, 19p Rept nos. TR-7, TR-141
Contract N00014-77-C-0306, Grant NSF-MCS77-16974

A sequential fixed width confidence interval is proposed for the log odds ratio of a 2 x 2 table. It is shown that the proposed interval has asymptotically the correct coverage probability and is asymptotically efficient uniformly in the unknown parameters. (Author)

AD-A082 868/1 Not available NTIS
Defence Research Establishment Valcartier (Quebec)
A Graphical Method to Evaluate Sample Sizes for the Multinomial Distribution,
Claude Angers. Oct 73, 4p DRB-REPRINT-4035
Availability: Pub. in Technometrics, v16 n3 p469-471 Aug 74 (No copies furnished by DTIC).

No abstract available.

AD-A082 920/0 PC **A02**/MF **A01**
Stanford Univ CA Dept of Statistics
Sequential Medical Trials (Stopping Rules/Asymptotic Optimality).
Technical rept.
T. L. Lai, Bruce Levin, Herbert Robbins, and David Siegmund. 4 Feb 80, 18p Rept no. TR-8
Contract N00014-77-C-0306
Prepared in cooperation with Columbia Univ., New York. Dept. of Mathematical Statistics.

A model for sequential clinical trials is discussed. Three proposed stopping rules are studied by Monte Carlo for small patient horizons and mathematically for large patient horizons. They are shown to be about equally effective and asymptotically optimal from both Bayesian and frequentist points of view. Their advantage over any fixed sample size rule is emphasized. (Author)

AD-A082 921/8 PC **A03**/MF **A01**
Stanford Univ CA Dept of Statistics
Approximating Conditional Moments of the Multivariate Normal Distribution.
Technical rept.,
Joseph G. Deken. Dec 79, 29p Rept no. TR-41
Contract N00014-75-C-0442

A practical method for computing the conditional expectation of a polynomial in the components of a multivariate normal random variable X, when X is restricted to a subset of R superscript p, is given. This method makes the application of certain missing data techniques possible in cases where repeated numerical integration is not feasible. (Author)

AD-A082 925/9 PC **A04**/MF **A01**
Wisconsin Univ-Madison Dept of Statistics
Ill Posed Problems: Numerical and Statistical Methods for Mildly, Moderately and Severely Ill Posed Problems with Noisy Data.
Technical rept.,
Grace Wahba. Feb 80, 74p Rept no. UWIS-DS-80-595
Contract N00014-77-C-0675

We discuss a number of topics related to the practical solution of ill posed problems given noisy data as it might arise in an experimental situation. The sensitivity of a regularized estimate of f to the noise is made explicit. After giving the intrinsic rank of the examples of first and second derivative, Abel's equation and Fujita's equation, it is argued that the first three are only mildly ill posed and f should be amendable to accurate estimation by the method of regularization. The method of Generalized Cross Validation (GCV) for choosing the regularization parameter is described and numerical results for the estimation of first and second derivative from noisy data are given. Two numerical algorithms for obtaining a regularized estimate with GCV are detailed. The second uses a B-spline basis to allow the handling of large data sets. This use of outside information in the estimation of f is discussed. We discuss the problem of checking the validity of the 'model' k, and provide a crude goodness-of-fit test. Finally we end by describing the (known) result that the number k of iterations in a Landweber iteration for solving large linear systems is a form of regularization parameter. We than show how GCV can feasibly be used to choose k in very large problems like those arising in computerized tomography.

AD-A082 943/2 PC **A03**/MF **A01**
Washington Univ Seattle Dept of Mathematics
Directionally Lipschitzian Functions and Subdifferential Calculus,
R. T. Rockafellar. 17 May 78, 30p AFOSR-TR-80-0269
Grant AFOSR-77-3204
Pub. in Proceedings of the London Mathematical Society, v39 Series 3 p331-355 Sep 79.

No abstract available.

AD-A082 991/1 PC **A03**/MF **A01**
Claremont Men'S Coll CA Inst of Decision Science
On Problems of Estimation for Two Parameter Decreasing Failure Rate Distributions Applied to Reliability.
Technical rept.,
Janet M. Myhre, and Sam C. Saunders. Mar 80, 38p Rept no. 80-2
Contracts N00014-78-c-0213, N00014-79-C-0755

In this paper some of the problems of parametric estimation for samples from distributions, which have decreasing failure rate, are discussed. Some of these distributions are obtained by mixing different exponential populations, others represent mechanisms analogous to 'work hardening' for each component where 'old is better than new'. Sufficient conditions are obtained that maximum likelihood estimators of appropriately chosen shape and scale parameters exist in both cases. The sample data which are available, when a decreasing failure rate distribution governs life, are usually censored with only a few failures observed; this limitation is dealt with. Actual data, obtained from the testing of integrated circuit electronic packages, are provided to illustrate these concepts and verify the applicability and usefulness of the techniques described. (Author)

AD-A083 006/7 PC **A03**/MF **A01**
California Univ Berkeley Operations Research Center
An Adaptive Bayesian Scheme for Estimating Reliability Growth under Exponential Failure Times.
Research rept.,
Nozer D. Singpurwalla. Dec 79, 32p Rept no. ORC-79-17
Grant AFOSR-77-3179
Prepared in cooperation with Stanford Univ., CA, Grant DAAG29-77-G-0031 and George Washington Univ., Washington, DC. Dept. of Operations Research.

In this paper we consider an adaptive approach for estimating reliability growth, based on prior information which is motivated from practical considerations. We discuss two situations: in the first one, both the prior distribution and the posterior distributions of the mean time to failure of an exponential distribution are stochastically ordered; in the

second situation, the prior distribution is stochastically ordered with respect to the last posterior distribution. The former situation leads us to a procedure which is not fully Bayesian, and is therefore termed by us as 'pseudo-Bayesian.' Since we do not know the properties of this pseudo Bayesian approach, we can best describe our work here as being a 'pseudo-Bayesian scheme.' The second situation leads us to an approach which is fully Bayesian under certain assumptions. Our work in this general area of reliability growth is still in progress, and we invite the attention of other researchers to look into some of the problems that we have posed, and the questions that we have raised. (Author)

AD-A083 032/3 PC **A03**/MF **A01**
Virginia Polytechnic Inst and State Univ Blacksburg
The Use of R and S2 Charts Under Nonstandard Conditions.
Research rept.,
D. R. Jensen, and Y. V. Hui. Mar 80, 31p RR-Q-3, ARO-15194.3-M
Grant DAAG-29-78-G-0172

R and S-squared charts for monitoring the variability of a process are studied when the control variance, (sigma sub 0) squared is unknown, when observations are non-Gaussian, and when the process drifts. Geometric bounds on run-length distributions for the R and S-squared charts are given for all underlying distributions when (sigma sub 0) squared is estimated in a base period. Similar bounds apply in the case of a drifting process, the notion of which is developed rigorously. It is shown that normal-theory properties of these charts hold exactly for every spherical process when a suitable estimate for (sigma sub 0) squared is used. Run-length distributions otherwise are shown to be ordered stochastically given a peakedness ordering on the underlying spherical processes. (Author)

AD-A083 033/1 PC **A02**/MF **A01**
Virginia Polytechnic Inst and State Univ Blacksburg
Inequalities for Joint Distributions of Quadratic Forms.
Research rept.,
D. R. Jensen. Dec 79, 17p RR-Q-1, ARO-15194.2-M
Grant DAAG29-78-G-0172

Chebychev inequalities are given for joint central and noncentral distributions of k quadratic forms; these are sharpened when k = 2 using the canonical correlations of Hotelling. Complementary inequalities are found as versions of Markov's inequality. Applications are noted in ballistics, in statistical quality control, in establishing consistency of Gauss-Markov estimates under dependence, and in constructing conservative joint confidence sets depending on the underlying distribution only through its low order moments. (Author)

CONF-781108- PC **A15**/MF **A01**
Sandia Labs., Albuquerque, NM.
1978 DOE Statistical Symposium.
H. T. Davis, R. R. Prairie, and T. Truett. Jul 79, 336p
Contract W-7405-ENG-26
DOE statistical symposium, Albuquerque, NM, USA, 1 Nov 1978.

Separate abstracts were prepared for 13 of the papers given at this symposium. The remaining two have already been cited in ERA, and may be found by referring to the entry CONF-781108-- in the Report Number Index. (ERA citation 05:012870)

COO-2874-T2 PC **A02**/MF **A01**
Stanford Univ., CA. Dept. of Statistics.
Statistical Considerations in Network Design.
P. Switzer. Aug 79, 14p
Contract EY-76-S-02-2874

Following some general remarks on the importance and unimportance of optimization in spatial network design, exploitation of spatial autocorrelations and covariate information is considered. It is pointed out that spatial autocorrelations, themselves, require care in their estimation; and two illustrations are given to show how probabilistic error calculations are made for mapping problems using network station data. One illustration uses a quantitative mapping variable and the other uses a qualitative mapping variable. (ERA citation 05:009047)

HMI-B-283 PC **A05**/MF **A01**
Hahn-Meitner-Inst. fuer Kernforschung Berlin G.m.b.H. (Germany, F.R.). Bereich Datenverarbeitung und Elektronik.
Smoothness and Numerical Solution of Linear Integral Equations of the Second Type with Weakly Singular Kernels.
J. Bechlars. Dec 78, 100p
In German.
U.S. Sales Only.

1) Integrable (L exp 1) singularities, occuring on the boundary or along the diagonal direction, and jumps along the diagonal direction do not disturb the compactness of otherwise continuous integral operator kernels. So the theory of compact operators can be applied for solving the integral equation. 2) Provided the regular parts of the kernel are sufficiently differentiable, the continuous differentiability (Cn) of the right hand side is transposed to the solution, if the kernel has no singularities or no singularities on the boundary and no jump. In the case of singularities in connection with a jump examples show, that this result is not valid in general. Therefore a second definition of smoothness has been introduced (Csup((n, alpha)) : continuous differentiability in the interior and 'limitation of derivatives') which can be applied in such cases and on the other side shows satisfactory error behaviour during interpolation and includes singularities from logarithms and negative powers. Provided diagonal singularities or singularities on the boundary can be asigned to Csup((n+1, alpha -1)) (0< alpha <=1) or Csup((n-1, alpha -1)) respectively, the smoothness of Csup((n, alpha)) can be transposed to the solution from the right hand side. 3) The theory of Anselones for collectively compact operators ascertains existence and convergence of approximate solutions obtained on the basis of the quadratic formula method by product integration. As shown, the convergence order can be estimated independent of steps and exact integrable singularities, and thus depend only on the interpolation error of the regular contributions, multiplied by the true solution. 4) For a special choice of interpolation knots for stepwise linear interpolation of solutions of C exp 2 also Csup((2, alpha)) (0< alpha <1) this error behaves like 0(n exp -2). This is confirmed by numerical examples. (Atomindex citation 10:467015)

IC-77-83 PC **A02**/MF **A01**
International Centre for Theoretical Physics, Trieste (Italy).
Positive Definite Functions of Infinitely Many Variables and the Stone Theorem for an Additive Group in a Hilbert Space.
I. M. Gali, and A. S. Ok el-Bab. Aug 77, 6p
U.S. Sales Only.

Our main purpose in this paper is to find the relationship between positive definite functions and the Stone theorem for an additive group on a Hilbert space. (Atomindex citation 09:415168)

IC-77-85 PC **A02**/MF **A01**
International Centre for Theoretical Physics, Trieste (Italy).
Positive-Definite Functions and Unitary Representations of Locally Compact Groups in a Hilbert Space.
I. M. Gali, A. S. Ok el-Bab, and H. M. Hassan. Aug 77, 7p
U.S. Sales Only.

It is proved that the necessary and sufficient condition for the existence of an integral representation of a group of unitary operators in a Hilbert space is that it is positive-definite and continuous in some topology. (Atomindex citation 09:415169)

ITEF-151(1978) PC **A03**/MF **A01**
Gosudarstvennyi Komitet po Ispol'zovaniyu Atomnoi Energii SSSR, Moscow. Inst. Teoreticheskoi i Eksperimental'noi Fiziki.
Limit Theorems of the Probability Theory.
E. S. Nikolaevskii. 1978, 38p
In Russian.
U.S. Sales Only.

The purpose of the investigation is to apply the saddlepoint method principles to the limit theorems of the probability theory. New formulations of the theorems are obtained, and under wider conditions the validity of the asymptotic expansions obtained earlier is shown. While deriving the formal expansion according to the modified saddle-point method lemmes related to the estimation of the expansion accuracy have been used. (Atomindex citation 10:467099)

ITEP-157(1978) PC **A02**/MF **A01**
Gosudarstvennyi Komitet po Ispol'zovaniyu Atomnoi Energii SSSR, Moscow. Inst. Teoreticheskoi i Eksperimental'noi Fiziki.
Explicit Solution of the Classical Generalized Toda Models.
M. A. Olshanetski, and A. M. Perelomov. 1978, 15p
U.S. Sales Only.

The explicit solution of the generalized Toda models connected with the root systems of the simple Lie algebras is constructed. This solution is obtained by special projection of the geodesic flows on some symmetric spaces on the phase space of the Toda models. In particular, for the usual N-body Toda model the solutions are expressed by minors of exponent of the Jacoby matrix depending on initial data. (Atomindex citation 10:467103)

JINR-R-2-11547 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Theoretical Physics.
Analytical Calculations by Computer in Physics and Mathematics.
V. P. Gerdt, O. V. Tarasov, and D. V. Shirokov. 1978, 22p
In Russian.
U.S. Sales Only.

The review of present status of analytical calculations by computer is given. Some programming systems for analytical computations are considered. Such systems as SCHOONSCHIP, CLAM, REDUCE-2, SYMBAL, CAMAL, AVTO-ANALITIK which are implemented or will be implemented in JINR, and MACSYMA - one of the most developed systems - are discussed. It is shown on the basis of mathematical operations, realized in these systems, that they are appropriated for different problems of theoretical physics and mathematics, for example, for problems of quantum field theory, celestial mechanics, general relativity and so on. Some problems solved in JINR by programming systems for analytical computations are described. The review is intended for specialists in different fields of theoretical physics and mathematics. (Atomindex citation 09:412262)

MLM-2645 PC **A03**/MF **A01**
Mound Facility, Miamisburg, OH.
Introduction to Multiple Comparison Procedures.
A. D. Grandillo. 28 Nov 79, 38p
Contract EY-76-C-04-0053

This introduction to multiple comparison procedures covers procedures for making linear contrasts and all pairwise multiple comparisons among observed treatment means from designed experiments. Some of the more common and popular multiple comparison procedures of Scheffe, Tukey, Fisher, Student-Newman-Keuls (SNK), Duncan, Duncan-Waller, and Dunnett are described in detail, and examples illustrate their use. Tables of the critical values for the SNK test (Studentized range), Duncan's new multiple range test, and Dunnett's test for comparing several treatments with a control are also given. 27 tables. (ERA citation 05:009554)

N80-21050/3 PC **A03**/MF **A01**
Massachusetts Inst. of Tech., Cambridge. Lab. for Information and Decision Systems.
Asymptotic Eigenstructures.
P. M. Thompson, and G. Stein. Apr 80, 36p
NASA-CR-162900, LIDS-P-982
Contract NAG1-2

The behavior of the closed loop eigenstructure of a linear system with output feedback is analyzed as

a single parameter multiplying the feedback gain is varied. An algorithm is presented that computes the asymptotically infinite eigenstructure, and it is shown how a system with high gain, feedback decouples into single input, single output systems. Then a synthesis algorithm is presented which uses full state feedback to achieve a desired asymptotic eigenstructure.

N80-21059/4 PC **A03**/MF **A01**
National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
Applying Integrals of Motion to the Numerical Solution of Differential Equations.
D. J. Vezewski. Mar 80, 29p NASA-TM-58225, JSC-16511

A method is developed for using the integrals of systems of nonlinear, ordinary, differential equations in a numerical integration process to control the local errors in these integrals and reduce the global errors of the solution. The method is general and can be applied to either scalar or vector integrals. A number of example problems, with accompanying numerical results, are used to verify the analysis and support the conjecture of global error reduction.

N80-21155/0 PC **A02**/MF **A01**
Nagoya Univ. (Japan). Inst. of Plasma Physics.
Steady Motions Exhibited by Duffing's Equation: A Picture Book of Regular and Chaotic Motions.
Y. Ueda. Jan 80, 14p IPPJ-434
Presented at the Eng. Foundation Conf. On New Approaches to Nonlinear Problems in Dyn., Monterey, Calif., 9-14 Dec. 1979.

Various types of steady states take place in the system exhibited by Duffing's equation. Among them harmonic, higher harmonic and subharmonic motions are popularly known. Then ultrasubharmonic motions of different orders are fairly known. However chaotic motions are scarcely known. Analog and digital computers are used to survey of the whole aspect of steady motions exhibited by Duffing's equation.

ORNL/TM-7084 PC **A03**/MF **A01**
Oak Ridge National Lab., TN.
Sampling Theory Methodology Applicable to Data Validation Studies.
M. R. Chernick. Jan 80, 44p
Contract W-7405-ENG-26

In data validation studies, surveys are conducted to obtain information about the data collection process and the uses of the data. In many cases standard sampling techniques can be used. Two methods, stratified random sampling and cluster sampling, were used for surveys in the Form 4 data validation study. Form 4 is a data collection system on monthly generation and consumption of fuels by electric power plants. A description of those applications is given. Sometimes time and cost constraints make more sophisticated controlled sampling approaches necessary. One such approach using balanced incomplete block designs is described; an appendix surveys the existence results for these designs. Sequential methods which may prove to be more cost effective are discussed, as are sequential approaches to the problem of determining the size of a population. Problems requiring further research are also discussed. Some preliminary results on the problem of stratification with respect to more than one variable are included. The results were obtained for the Form 4 respondent population. The Form 4 study indicated that standard statistical sampling methods could be useful in data validation surveys. For example, at least 30 percent of the respondents do not report net generation as the instructions define it, and only 25 percent of the state regulatory agencies use the Form 4 data. Such inferences were possible only because statistical sampling procedures were used. 3 tables. (ERA citation 05:011014)

SAND-79-2233C PC **A02**/MF **A01**
Sandia Labs., Albuquerque, NM.
Solving Structures Problems Iteratively with a Shifted Incomplete Cholesky Preconditioning.
T. A. Manteuffel. 1979, 21p CONF-791201-3
Contract EY-76-C-04-0789
IRIA international symposium on computing methods in applied science and engineering, Versailles, France, 10 Dec 1979.

A technique for solving the large sparse symmetric linear systems that arise from the application of finite element methods is described. The technique combines an incomplete factorization method called the shifted incomplete Cholesky factorization with the method of generalized conjugate gradients. The shifted incomplete Cholesky factorization produces a splitting of the matrix A that is dependent upon a parameter alpha . It is shown that, if A is positive definite, then there is some alpha for which this splitting is possible and that this splitting is at least as good as the Jacobi splitting. The method is shown to be more efficient on a set of test problems than either direct methods of explicit iteration schemes. 4 figures, 1 table. (ERA citation 05:012801)

12B. Operations Research

AD-A082 483/9 PC **A02**/MF **A01**
California Univ Los Angeles School of Engineering and Applied Science
Reduced Optimal Linear Programming Model via Its Representation as a Control System in Steady State,
M. J. Goldman, and C. T. Leondes. 5 Mar 79, 8p AFOSR-TR-80-0108
Grant AFOSR-76-2958
Pub. in Computer and Electrical Engineering, v6 p175-181 1979.

No abstract available.

AD-A082 614/9 PC **A02**/MF **A01**
California Univ San Deigo La Jolla Dept of Electrical Engineering and Computer Sciences
Combinatorial Algorithms in Operations Research.
Final rept. 1 Sep 75-31 Dec 79,
T. C. Hu. 10 Mar 80, 5p ARO-12945.3-M
Grant DAAG29-76-G-0031

Nine technical papers and a manuscript of a book on 'Combinatorial Algorithms' were prepared. The most significant discoveries are two algorithms of constructing binary tree optimum under various criteria. The first algorithm constructs optimum binary trees which include Huffman's tree as a special case. The second algorithm constructs optimum alphabetic trees which include Hu-Tucker tree as a special case.

AD-A082 630/5 PC **A02**/MF **A01**
University of Southern California Los Angeles Dept of Electrical Engineering
Estimation and Identification for Modeling Dynamic Systems.
Final rept. 1 Jan 75-31 Dec 79,
Jerry M. Mendel. Feb 80, 25p AFOSR-TR-80-0208
Grant AFOSR-75-2797

This document is the Final Report on AFOSR Grant 75-2797. It summarizes the research activity during the period January 1, 1975 - December 31, 1979 on the subjects of: multistage algorithms, identification from input/output data, modeling, estimation, and identification of layered media systems, and some miscellaneous topics. (Author)

AD-A082 735/2 PC **A02**/MF **A01**
System Development Corp Huntsville AL
REDIMEN: Systems Analysis of Integrated Networks of Tasks (SAINT) Redimensioning Program.
Technical rept. Jul 77-Oct 79,
Deborah J. Seifert, George Koeplinger, and Constance M. Hoyland. Feb 80, 20p SDC-TM-HU-539/000/00, AMRL-TR-80-5
Contract F33615-79-C-0505
Prepared in cooperation with Dayton Univ. Research Inst., OH.

The SAINT (Systems Analysis of Integrated Networks of Tasks) computer programs have fixed storage array dimensions. Different models may have storage requirements less than (or greater than) the presently defined array sizes in SAINT, which makes the SAINT programs inefficient (or impossible to run) unless the common statements in all of the subroutines are redimensioned. This is a laborious, error-prone task. REDIMEN was designed and implemented to eliminate most of the manual labor required to revise the SAINT source codes to tailor array sizes to the model or problem at hand. This document describes the REDIMEN program, its source code, necessary inputs, and its utilization in conjunction with SAINT applications efforts. (Author)

AD-A082 736/0 PC **A10**/MF **A01**
Stanford Univ CA Dept of Operations Research
Regenerative Simulation of Response Times in Networks of Queues.
Technical rept.,
Donald L. Iglehart, and Gerald S. Shedler. Nov 79, 211p Rept no. TR-52
Contract N00014-76-C-0578, Grant NSF-MCS75-23607
Sponsored in part by Grant NSF-MCS79-09139.

Networks of queues occur frequently in diverse applications. In particular, they are widely used in studies of computer and communication system performance as models for the interactions among system resources. This monograph deals with mathematical and statistical methods for discrete event simulation of networks of queues. The emphasis is on methods for the estimation of general characteristics of 'passage times' in closed networks. Informally, a passage time is the time for a job to traverse a portion of a network. Such quantities, calculated as random sums of queueing times, are important in computer and communication system models where they represent job response times. (Author)

AD-A082 779/0 Not available NTIS
Shape Technical Center the Hague (Netherlands)
Evaluation and Incremental Determination of Almost Optimal Allocations of Resources.
Professional paper,
K. M. Mjelde. Nov 76, 10p Rept no. STC-PP-127
Availability: Pub. in Operational Research Quarterly, v27 n3 p1-8 1976 (No copies furnished by DTIC).

No abstract available.

AD-A082 850/9 PC **A03**/MF **A01**
Carnegie-Mellon Univ Pittsburgh PA Management Sciences Research Group
A Study of the Bottleneck Single Source Transportation Problem.
Management sciences research rept.,
Robert V. Nagelhout, and Gerald L. Thompson. Mar 80, 32p Rept nos. MSRR-456, WP-54-79-80
Contract N00014-75-C-0621

Given a set of users with known demands, a set of suppliers with known supplies, and known costs of shipping between suppliers and users the Bottleneck Single Source Transportation is that of assigning the users to the suppliers so that the following conditions are satisfied: the demand of each user is satisfied by a single supplier; the amount supplied by each supplier does not exceed its capacity; the maximum cost of supplying any user by its unique supplier is minimal. Applications of this problem include: voter redistricting, shipping perishable goods, assignment of city blocks to emergency facilities, and others. We first discuss a heuristic method which tries to find a feasible solution by assigning the users in order of decreasing demand to the suppliers according to certain orders. In our experience on randomly generated problems, the heuristic was able to find a good, and frequently an optimal feasible solution, most of the time. If the heuristic fails to find a solution, or finds a solution which is not known to be optimal, then a branch and bound algorithm, using ordinary bottleneck transportation problems as relaxations, is employed to find the optimum single source solution. Computational experience on some randomly generated problems up to 100 x 400 is presented which indicated that these problems can be solved in less than 2 minutes. Also several small problems with real data were solved; in all but one of these problems the heuristic succeeded in finding an optimal solution. (Author)

AD-A082 866/5 Not available NTIS
Montreal Univ (Quebec) Departement D'Informatique
Multicommodity Flow Problem with Variable Arcs Capacities,
Jacques A. Ferland, Andre Girard, and Louis Lafond. 1978, 7p DRB-REPRINT-4209

Availability: Pub. in Jnl. of the Operational Research Society, v29 n5 p459-467 1978 (No copies furnished by DTIC).

No abstract available.

AD-A082 924/2 PC **A03**/MF **A01**
Army Research Inst for the Behavioral and Social Sciences Alexandria VA
An Algorithm for Computerized Adaptive Decision Analysis.
Final rept. Jan-Sep 76,
James L. Raney. Sep 79, 42p Rept no. ARI-TR-406

This research investigated an application of recent results in conjoint measurement theory research with the aim of developing a new methodology for (1) modeling a decision process used to evaluate preferences for complex choice alternatives, and (2) producing measurement scales for choice component factors and composite choice alternatives based on the decision model. An algorithm for interactive conjoint measurement (ICM) was developed to minimize the problems of redundancy and random error in testing the additive-independence model (AIM) in pair-comparisons designs with fallible data. No provisions were made for handling the systematic error problem or for accommodating more than two choice component factors. The ICM algorithm was tested in error-free data and in data with random error. The results showed that this ICM algorithm performed rather poorly. (Author)

ORNL/TM-7083 PC **A03**/MF **A01**
Oak Ridge National Lab., TN.
Inferring Network Flows from Incomplete Information with Application to Natural Gas Flows.
J. N. Hooker. Feb 80, 36p
Contract W-7405-ENG-26

A method is detailed for estimating flows along arcs (edges or links) of a network, such as a transportation network, when the total outflow and total inflow at each node (vertex) are known. It proves the optimality of a greedy method of choosing flows for independent estimation so as to determine the other flows, and does so by exploiting an underlying matroid structure. The resulting problem is formulated both as a linear program and a multi-commodity flow problem, and sensitivity analysis is performed. The technique is applied to the estimation of US state-to-state natural gas flows in the years 1974 to 1977, and numerical results are presented; 1974 and 1975 results are checked against actual data. The potential application of the same technique to the estimation of disaggregate data (of any kind), when aggregate and some disaggregate data are known, is pointed out. (ERA citation 05:013095)

PB80-168727 PC **E04**/MF **E04**
International Inst. for Applied Systems Analysis, Laxenburg (Austria).
The Simplex Method for Dynamic Linear Programs.
Final rept.,
A. Propoi, and V. Krivonozhko. c1978, 94p RR-78-14

This paper presents an extension of the simplex method, the basic method for solution of dynamic linear programming problems. The paper consists of three parts. Part I concerns theoretical properties of the problem, primarily duality relations; Part II describes the idea and the theory of the method; and Part III gives a complete description of the algorithm, as well as the connection with the basis factorization approach. Part III also includes a numerical example that is not trivial for a general LP algorithm but is solved very easily by using the dynamic simplex method. Part II is written in a language more familiar to control theory specialists, while Part III is closer to linear programming. All parts are written as independent papers with their own references and thus can be read independently. However, the whole paper comprises a theory of finite-step methods for DLP.

PB80-169634 PC **E03**/MF **E03**
International Inst. for Applied Systems Analysis, Laxenburg (Austria).
Nonsmooth Optimization and Descent Methods.
Final rept.,
Claude Lemarechal. c1978, 34p RR-78-4

The report describes the basic concepts underlying nonsmooth optimization. The classical methods, aimed at optimizing nondifferentiable problems are outlined. A list of possible applications, including acceleration of gradient type methods, general decomposition--by prices, by resources, and Benders decomposition--minimax problems, and computation of economic equilibria is given. The most modern methods for nonsmooth optimization are discussed. A new descent method based on concepts of variable metric, cutting plan approximation and feasible directions is developed. Its motivation, convergence, and flexibility are studied.

PB80-170277 Not available NTIS
National Bureau of Standards, Washington, DC.
Batch Scheduling from Short Lists.
Final rept.,
G. Lyon. 1979, 3p
Pub. in Information Processing Letters 8, n2 p57-59, 15 Feb 79.

Almost all of m appointment slots can be assigned nearly optimally in O(m) provided appointment preferences are sufficiently random. And while there may be hundreds of appointments, each client need only indicate a set of five or six preferred times. These results are in sharp contrast to the standard assignment solution that costs O(m(star)(star)3) in the worst-case and demands that each client provide a preference order for all m slots.

13. MECHANICAL, INDUSTRIAL, CIVIL, AND MARINE ENGINEERING

13A. Air Conditioning, Heating, Lighting, and Ventilating

AD-A082 521/6 PC **A02**/MF **A01**
MITRE Corp Bedford MA
Illumination Criteria in Imaging System Design for Security Applications,
A. J. Graff, P. Nesbeda, and T. Sheridan. Dec 79, 7p ESD-TR-79-259
Contract F19628-77-C-0001

Of paramount importance in the design of an effective imaging system for security applications, such as perimeter and area surveillance, is the establishment of artificial illumination criteria which are compatible with the requirements of both the imaging cameras and human observers. The 'American National Standard Practice for Protective Lighting,' ANSI A85.1-1956(R 1970), lists requirements for the illumination of boundaries. These requirements apply to direct visual observation by guards. In television viewing, the much reduced dynamic range of the sensor relative to the human eye and camera responsiveness introduce a new problem. The MITRE Corporation has developed a set of criteria for perimeter lighting in an Imaging System. The requirements express the minimum maintained average illumination within the lighted strip and the maximum variation of the minimum level at any point on the ground from the average level. A prototype imaging/illumination system was developed and tested which incorporates high pressure sodium vapor lamps, roadway luminaires and silicon diode array television cameras. Tests were conducted in an operational environment. (Author)

ANL/CNSV-TM-25 PC **A13**/MF **A01**
Alabama Univ., University. Bureau of Engineering Research.
Heat-Pump-Centered Integrated Community Energy Systems.
W. J. Schaetzle, C. E. Brett, and M. S. Seppanen. Dec 79, 283p
Contract W-31-109-ENG-38

The heat-pump-centered integrated community energy system (HP-ICES) supplies district heating and cooling using heat pumps and a thermal energy storage system which is provided by nature in underground porous formations filled with water, i.e., aquifers. The energy is transported by a two-pipe system, one for warm water and one for cool water, between the aquifers and the controlled environments. Each energy module contains the controlled environments, an aquifer, wells for access to the aquifer, the two pipe water distribution system and water source heat pumps. The heat pumps upgrade the energy in the distribution system for use in the controlled environments. Economically, the system shows improvement on both energy usage and capital costs. The system saves over 60% of the energy required for resistance heating; saves over 30% of the energy required for most air-source heat pumps and saves over 60% of the energy required for gas, coal, or oil heating, when comparing to energy input required at the power plant for heat pump usage. The proposed system has been analyzed as demonstration projects for a downtown portion of Louisville, Kentucky, and a section of Fort Rucker, Alabama. The downtown Louisville demonstration project is tied directly to major buildings while the Fort Rucker demonstration project is tied to a dispersed subdivision of homes. The Louisville project shows a payback of approximately 3 y, while Fort Rucker is approximately 30 y. The primary difference is that at Fort Rucker new heat pumps are charged to the system. In Louisville, either new construction requiring heating and cooling systems or existing chillers are utilized. (ERA citation 05:013807)

ANL-79-102 PC **A06**/MF **A01**
Argonne National Lab., IL.
Design of a System Using CPC Collectors to Collect Solar Energy and to Produce Industrial Process Steam.
C. K. Hsieh. Aug 79, 105p
Contract W-31-109-ENG-38

A system has been designed to use CPC collectors to collect solar energy and to generate steam for industrial process heat purposes. The system is divided into two loops with the collectors in the collector loop to operate a preheater and the collectors in the boiler loop to heat water to elevated pressures and temperatures. A flash boiler is used to throttle the heated water to steam. Two types of CPC collectors are chosen. In the collector loop the CPC collectors are fitted with concentric tube receivers. In the boiler loop the collectors employ heat pipes to transmit heat. This design is able to alleviate the scaling and plumbing problems. A fragile receiver tube can also be employed without rupture difficulties. The thermal processes in the collectors were analyzed using a computer modeling. The results were also used to develop a thermodynamic analysis of the total system. Calculations show that the design is technically feasible. The CPC collector is shown to have an efficiency that is very weakly dependent on its operating temperatures, which makes the collector particularly attractive in high temperature applications. (ERA citation 05:013379)

ANL-79-103 PC **A04**/MF **A01**
Argonne National Lab., IL.
Nondestructive Evaluation Techniques for Silicon Carbide Heat-Exchanger Tubes. Second Annual Report, October 1978-September 1979.
D. S. Kupperman, D. Yuhas, W. Deininger, and C. Sciammarella. Nov 79, 66p
Contract W-31-109-ENG-38

This report discusses the development of ultrasonic testing, acoustic microscopy, dye-enhanced radiography, holographic interferometry, and infrared scanning techniques for flaw detection in silicon carbide (SiC) heat-exchanger tubing. Both preservice and in-service testing requirements are discussed. An ultrasonic boreside probe and an acoustic microscope stage have been designed for continuous monitoring of SiC tubing. Preliminary results with these acoustic systems are presented. In addition, a novel technique for detecting small surface flaws using holographic interferometry is discussed. Fracture mechanics analysis suggests that detection of flaws on the order of 100 mu m is necessary to assure good reliability of ceramic heat exchangers. The acoustic and holographic techniques have been shown to be capable of detecting flaws of this size. However, the sensitivity of ultrasonic flaw detection in SiC is affected by the microstructure of the component. The practical considerations involved in the use of these techniques are discussed. (ERA citation 05:014032)

COO-2588-T1 PC **A02**/MF **A01**
Wisconsin Univ.-Madison. Solar Energy Lab.
Simulation and Design of Solar Thermal Processes.
31 Oct 79, 16p
Contract EY-76-S-02-2588

Research on simulation using TRNSYS and FCHART methods is described including systems analysis, user services, design procedures, and model validation. (ERA citation 05:013348)

COO-4094-73 PC **A02**/MF **A01**
Massachusetts Inst. of Tech., Lexington. Lincoln Lab.
Performance of a Photovoltaically Powered Air-Conditioning System.
E. C. Kern, Jr., and A. R. Millner. 1980, 6p
CONF-800106-14
Contract EY-76-C-02-4094
14. photovoltaics specialists conference, San Diego, CA, USA, 7 Jan 1980.

A vapor-compression air conditioner coupled directly to a photovoltaic array is discussed. Previous analyses of such a system are reviewed, and a development system designed to test the concept is described. Preliminary experiments indicate that the performance of this initial system falls considerably short of analytic expectations. (ERA citation 05:013303)

COO-4719-2 PC **A02**/MF **A01**
Middlebury Coll., VT.
Microprocessor Controlled Solar Collector System. Technical Progress Report No. 3.
15 Nov 79, 14p
Contract EM-78-S-02-4719

The strategy and initial results of a microprocessor control system for a solar water heating system are described. Two hot water storage tanks are utilized. (ERA citation 05:013373)

COO-4977/1(V.1) PC **A03**/MF **A01**
Public Service Electric and Gas Co., Newark, NJ.
District Heating and Cooling Systems for Communities Through Power Plant Retrofit Distribution Network. Volume 1. Executive Summary Final Report, September 1, 1978-May 31, 1979.
Oct 79, 40p
Contract EM-78-C-02-4977

The technical-economic feasibility and environmental acceptability of a district heating and cooling system serving communities by retrofit of existing intermediate and base-load electric generating stations was studied. The study area was a densely populated area of New Jersey not being served by district heating. A range of powyr plant retrofit concepts were examined. Conceptual designs for retrofitting power plants for cogenerative operation (electricity and district heating/cooling) were developed. Innovative adaptations of existing technology were investigated that could make delivery of thermal services from central stations a reasonable investment for private capital. A market analysis was conducted to establish the extent and nature of the potyntial heating and cooling loads which are technically available within the proposed project areas. Potential for growth in thermal energy requirements was projected for each type of end-use consumer for periods ranging from 5 to 20 y beyond the study period. It was concluded from the phase I study that district heating/cooling has a market potential in areas with high density thermal loads; district heating offers greater near-term potential than cooling; hot water distribution systems would be best for heat transmission; the economics are marginally favorable; no legal, regulatory, nor environmental obstacles were found; and a more detailed study is justified. (ERA citation 05:013815)

COO-4979-1(V.2) PC **A12**/MF **A01**
Toledo Edison Co., OH.
District Heating and Cooling Systems for Communities Through Power-Plant Retrofit and Distribution Network. Volume 2. Tasks 1-3. Final Report.
J. R. Watt, and G. A. Sommerfield. Aug 79, 251p
Contract EM-78-C-02-4979

Each of the tasks is described separately: Task 1 - Demonstration Team; Task 2 - Identify Thermal Energy Source(s) and Potential Service Area(s); and Task 3 - Energy Market Analysis. The purpose of the project is to establish and implement measures in the downtown Toledo steam system for conserving scarce fuel supplies through cogeneration, by retrofit of existing base- or intermediate-loaded electric-generating plants to provide for central heating and cooling systems, with the ultimate purpose of applying the results to other communities. For Task 1, Toledo Edison Company has organized a Demonstration Team (Battelle Columbus Laboratories; Stone and Webster; Ohio Dept. of Energy; Public Utilities Commission of Ohio; Toledo Metropolitan Area Council of Governments; and Toledo Edison) that it hopes has the expertise to evaluate the technical, legal, economic, and marketing issues related to the utilization of by-product heat from power generation to supply district heating and cooling services. Task 2 gives a complete technical description of the candidate plant(s), its thermodynamic cycle, role in load dispatch, ownership, and location. It is concluded that the Toledo steam distribution system can be the starting point for developing a new district-heating system to serve an expanding market. Battelle is a member of the team employed as a subcontractor to complete the energy market analysis. The work is summarized in Task 3. (ERA citation 05:013817)

DOE/CS-0117 PC **A04**/MF **A01**
Department of Energy, Washington, DC.
Proposed Energy-Performance Standards for New Buildings: Passive and Active Solar-Heating Analysis. Technical Support Document.
Nov 79, 70p

The standards being developed by DOE for new buildings will establish maximum permissible levels of annual building Design Energy Consumption for different building types in various climates. Besides reducing the use of depletable energy, the standards are intended to achieve maximum practicable increases in the use of nondepletable sources of energy. In the process of setting the standards, an economic analysis was conducted, using the annual life-cycle cost method for energy conservation measures in new single-family residential buildings. That analysis was conducted by Battelle PNL and LBL and is documented in Technical Support Document, Economic Analysis. This present analysis evaluates the use of both passive and active solar thermal heating technologies, providing cost and energy savings estimates for optimally-sized passive solar systems corresponding to the prototype house characteristics represented by each point on the conservation cost/performance curves (from the previous studies). An anlysis was performed for each of the ten (Atlanta, Burbank, Chicago, Fresno, Ft. Worth, Houston, Minneapolis, Phoenix, Portland, and Washington) representative cities in the conservation study analysis. The key elements of this methodology are: thermal performance estimation, optimum system size determination, and sensitivity analysis. (ERA citation 05:010247)

DOE/CS-0119 PC **A06**/MF **A01**
Department of Energy, Washington, DC. Office of Conservation and Solar Applications.
Proposed Energy Performance Standards for New Buildings: Energy Budget Levels Selection. Technical Support Document.
Nov 79, 102p

This document sets forth the data and procedures used by DOE to select proposed energy budget levels. Of three broad categories of new buildings (commercial, residential, and mobile homes), DOE determined that sufficient information existed upon which to select energy budget levels for single-family residential, and commercial and multifamily residential buildings. Because of analytical difficulties in separating process energy requirements from space-conditioning energy requirements, no energy budget levels are proposed for industrial buildings or restaurants. Also, inconclusive analyses resulted in no energy budget levels being proposed for mobile homes. DOE conducted extensive analyses of the design energy requirements of buildings, utilizing a variety of approaches. One approach was to conduct architectural studies of samples of commercial, residential, and mobile-home designs. Simulation studies were conducted to analyze the design energy requirements of prototypical single-family residential buildings. A separate life-cycle cost study of office buildings was done. Economic studies were conducted to assess the impact of different assumed levels of the standards on building owners, elements of the construction industry, and the nation as a whole. This document explains the energy budget levels selection process and the data upon which DOE relied. (ERA citation 05:012084)

DOE/CS/30108-T1 PC **A05**/MF **A01**
TPI, Inc., Beltsville, MD.
Committee on the Challenges of Modern Society Solar Energy Pilot Study. First Follow-Up Report, October 1979, Pilot Country: United States; CO-Pilot Countries: Denmark and France. CCMS Report No. 110.
Jan 80, 84p
Contract AC02-79CS30108

During 1973 to 1978, over twenty nations participated in the NATO/CCMS Solar Energy Pilot Study, whose objective was to promote and accelerate the use of solar heating and cooling of buildings. The activities in this information exchange included (1) the regular reporting of national solar heating and cooling programs, (2) the development of a format for reporting the performance of solar heating and cooling systems, (3) the exchange of system performance reports, (4) the establishment of two specialized working groups for solar-assisted low energy dwellings and passive solar applications. At the conclusion of the pilot study in 1978, the participants formulated recommendations for continued action at the international level, as well as for action at the national level. This report describes the progress made in implementing those recommendations. In addition to detailing the steps taken to continue collaboration in various efforts initiated within the Solar Energy Pilot Study, the report contains papers on the 1979 status of the solar heating and cooling programs in seventeen CCMS countries. (ERA citation 05:011648)

DOE/ET/27026-T1 PC **A02**/MF **A01**
Radian Corp., Austin, TX.
Circulating Pump Impeller: Presbyterian Intercommunity Hospital, Klamath Falls, Oregon, Geothermal Heating System. Failure Analysis Report.
D. A. Mitchell, and P. F. Ellis. 30 Nov 79, 16p
Contract AC02-79ET27026

The Presbyterian Intercommunity Hospital located in Klamath Falls, Oregon utilizes geothermal fluid pumped from its own well to provide space heat and domestic hot water. During an inspection of the heating system after a chemical cleaning of the heat exchangers, the circulating pump was dismantled to replace its seals which were found to be leaking. At that time, the impeller was found to contain many cracks. The analysis of those cracks and a scale sample removed from the impeller is presented. (ERA citation 05:011792)

DOE/ET/28469-4 PC **A09**/MF **A01**
Oregon State Univ., Corvallis.
Performance and Feasibility of Forced Geoheat Recovery for Low Temperature Applications. Final Report, April 1, 1978-June 30, 1978.
G. Bodvarsson, and G. M. Reistad. 1978, 198p
RLO-2227/T36-4
Contract EY-76-S-06-2227-036

Forced geoheat recovery (FGR) resources and production technology are reviewed. Utilization of geothermal fluids in the temperature range 15 exp 0 C to 150 exp 0 C for building heating and industrial purposes is covered. Results on the technoeconomic feasibility of FGR systems to supply energy for building heating are summarized. (ERA citation 05:013434)

DOE/R5/10140-1 PC **A02**/MF **A01**
Toledo Univ., OH.
Performance Improvement of a Solar Heating System Utilizing off-Peak Electric Auxiliary. Semi-Annual Progress Report, June 18, 1979-December 31, 1979.
A. H. Eltimsahy. Dec 79, 10p
Contract FG02-79R510140

During the period 18 June 1979 through December 1979, a solar assisted heat pump system was de-

signed, installed and operated in the University of Toledo Experimental Solar House. The heat pump system is capable of operating in a wide range of temperatures which is needed in a solar house utilizing off-peak storage from the electric utility. The complete system consists of 584.1 square feet of Libbey-Owens-Ford's flat plate solar collectors, a 5 horsepower compressor (Victaulic Corp.), an evaporator (Dunham-Bush), a condensor (Dunham-Bush), thermal storage units, and associated equipment. During the installation and initial operation of the system, numerous aspects of the feasibility of this system design have been evaluated. Many of these aspects point to the potentially improved operating performance of a solar heating system utilizing off-peak storage from the electric utility. (ERA citation 05:011651)

DSE-5171-2 PC **A04**/MF **A01**
One Design, Inc., Winchester, VA.
Design, Fabrication and Testing of a Marketable Waterwall Component. Final Technical Report, 1 September 1978-31 August 1979.
T. J. Maloney, and V. Habib. Aug 79, 70p
Contract EM-78-C-01-5171

One Design, Inc., has designed and developed modular waterwall components that make up a system for passive solar space heating using a south-facing thermal storage wall. The modules can also be used as thermal mass storage for roof apertures and for greenhouse applications. The modules are constructed of fiberglass reinforced polyester and each is 95 inches long, 16.5 inches wide and 24.5 inches tall. Each module contains 94 gallons or 784 pounds of water. When stacked behind south glazing, they provide 52 Btu/ exp 0 F per square foot of net glazed area. A stack of four modules has a height of 93.5 inches, suitable for an 8-foot interior ceiling; a stack of five modules is 116.5 inches high, suitable for a 10-foot interior ceiling. The modules are designed to stack on one another without requiring additional hardware and nest inside each other to reduce shipping costs. Prototype modules were fabricated and subjected to structural tests. They were found to be capable of supporting at least 4.8 times the load imposed by a five tank stack, well above the recommended safety factor of 2. Long term purity of the water in the containers was tested and evaluated and found to be within acceptable limits. Prototype modules were installed in One Design's Star Tannery House near Winchester, Virginia, and performance was extensively monitored from January to April, 1979. Based on the performance during the period, it has been estimated that the passive solar heating contribution would be 79.5% of the house's total heating requirement. (ERA citation 05:011652)

EPRI-ER-1206-SY PC **A04**/MF **A01**
Little (Arthur D.), Inc., Cambridge, MA.
Detailed Designs and Construction: Individual Load Center - Solar Heating and Cooling Residential Project. Summary Report.
D. Nathanson, and J. L. Swanson. Nov 79, 67p

Conceptual system designs for each of ten experimental solar/load managed residences are given. The five residences in Albuquerque, New Mexico are of conventional Southwest design with particular care being paid to energy conserving features and aesthetic integration of solar collectors. On Long Island, New York the houses will be slightly different in appearance, but designed with the same demanding standards as the Albuquerque houses. The design and procurement approach for the experimental subsystems (solar, load management, heat pump, and instrumentation and controls) were based upon a turnkey approach. Vendors were selected based on their response to performance specifications and drawings issued for each system. Solar equipment for the residences is of both liquid and air type. Careful attention was paid to integration of the solar collectors into the basic house architecture. Both hot water and space heating functions are provided for in the solar designs. The load management thermal storage systems will incorporate both buried and above ground tanks with the flexibility to operate at either half or full capacity. Heat pumps are to be used in each residence and will be of either a multimode design or multiple, conventional air-to-air and water source heat pumps. The instrumentation and control systems will be remote and field programmable based on microprocessor technology. All ten houses have been built, had their experimental systems installed and are currently occupied. Data retrieval and analysis have begun. (ERA citation 05:011653)

FE-2346-41 PC **A02**/MF **A01**
Dow Chemical Co., Midland, MI. Hydrocarbons and Energy Research Dept.
Antrim Oil Shale-Electric Heater and Propane Burner Field Ignition Experiments. Topical Report, August 1977-April 1978.
J. L. Cole, and J. E. Shannon. Oct 79, 21p
Contract EX-76-C-01-2346

The Dow Chemical Company contract with the Department of Energy to investigate the feasibility of recovering energy from Antrim oil shale by an in situ process required that an extraction trial be conducted using wells previously drilled by Dow. During this trial, two systems were used to initiate in situ combustion. An electric heater ignited the shale after two similar heaters were unsuccessful. The failures were due to electric short-circuits and corrosion. Of four attempts to initiate combustion with a propane burner, two were succesful, although considerable difficulty was experienced because the thermocouples placed in the well to provide positive indication of burner ignition were not durable. These results indicate the need for additional developmental work to make the burner more dependable and more easily ignitable. (ERA citation 05:013102)

ISM-206 PC **A02**/MF **A01**
Iowa State Univ. Ames.
Preliminary Study of Passive Solar Heating Performance and Visual Clarity for a Transwall Structure.
J. F. McClelland, and R. Fuchs. 1979, 7p CONF-790118-7
Contract W-7405-ENG-82
National passive solar conference, San Jose, CA, USA, 11 Jan 1979.

The thermal performance of a new passive solar heating system called Transwall has been compared to that of Trombe wall and direct gain systems using thermal network models. The Transwall system is a visually transparent modular water wall which thermalizes a high percentage of incident solar radiation within a water based storage medium by absorption of the radiation in both the water and in a semitransparent plate positioned between the light transmitting walls of the water-filled modules. The Transwall structure allows vision to the exterior through the solar gain fenestration and provides a direct gain contribution to the building heating requirements. Because of the strong light attenuation by the Transwall, the direct gain operation of the system does not suffer from severe glare and photodegradation problems which occur in some direct gain interiors. (ERA citation 05:011654)

LA-UR-79-1897 PC **A03**/MF **A01**
Los Alamos Scientific Lab., NM.
Adaptive Optimal Control: An Algorithm for Direct Digital Control.
D. R. Farris, and T. E. McDonald. 1980, 32p CONF-800206-1
Contract W-7405-ENG-36
American Society of Heating, Refrigeration, and Air Conditioning Engineers semi-annual meeting, Los Angeles, CA, USA, 3 Feb 1980.

An algorithm for applying advanced control concepts in heating, ventilating, and air conditioning (HVAC) systems has been developed at the Los Alamos Scientific Laboratory (LASL). The algorithm uses optimal control and is adaptive in nature. Simulations for a solar heated and cooled building indicate that use of this algorithm can accomplish a substantial savings in auxiliary energy consumption. In this paper, the algorithm is described and its application is illustrated with a simple example. Simulation results for a more complex system are also presented. The hardware, including the digital computer, needed to implement this algorithm is briefly discussed. (ERA citation 05:011655)

LA-UR-79-3354 PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
Use of Adaptive Optimal Control to Provide Energy Conservation in Large Buildings.
D. R. Farris, and D. E. Miller. 1979, 9p CONF-791222-1
Contract W-7405-ENG-36
18. IEEE conference on decision and control, Fort Lauderdale, FL, USA, 12 Dec 1979.

The use of an adaptive linear regulator approach for controlling heating, ventilating, and air-conditioning (HVAC) systems in large buildings is discussed. The control manifestations of this approach are compared with those found in conventional applications. The salient features of the approach are discussed, and simulation results are presented. Implementation is discussed, and economic estimates for commercial use of this approach are also presented. (ERA citation 05:008773)

LA-8066-PR PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
Magnetic Refrigerator Development. Progress Report, June 1-August 31, 1979.
J. A. Barclay, J. C. Bronson, and W. A. Steyert. Dec 79, 8p
Contract W-7405-ENG-36

The report records the progress on the reciprocating magnetic refrigerator project. The annular Dewar for the 9-T magnet has been completed and tested. The apparatus for the first set of experiments has been designed. There is no information on the magnetic wheel refrigerator in the report. (ERA citation 05:012274)

LBL-9370 PC **A02**/MF **A01**
California Univ., Berkeley. Lawrence Berkeley Lab.
Effect of Occupant Use Patterns on the Performance of Direct-Gain Passive Solar Systems.
R. Kammerud, and W. Place. Oct 79, 9p CONF-791009-24
Contract W-7405-ENG-48
International conference on energy use management, Los Angeles, CA, USA, 22 Oct 1979.

The effects of thermostat control profiles on the energy consumption of the auxiliary heating system in direct-gain passive solar buildings has been studied. The building energy analysis computer program BLAST-2 was used to simulate the thermal performance of high-mass and low-mass direct gain configuration in each of two climatic regions. The results indicate that passive system performance is very sensitive to the manner in which the occupant controls the auxiliary system. Under some control strategies, the performance can actually be degraded by commonly recommended levels of thermal storage mass within the structure. (ERA citation 05:009958)

LBL-9483 PC **A05**/MF **A01**
California Univ., Berkeley. Lawrence Berkeley Lab.
High Frequency Lighting Systems. Review of Previous Systems Performance Records, Proposal for Optimum System Anthology: Bibliography.
J. H. Campbell. Jun 79, 86p
Contract W-7405-ENG-ENG-48

The development of high frequency fluorescent lighting systems for providing higher illumination levels for large buildings at lower operating costs is reviewed and summarized for the past 27 years. Data on the design, performance, and economics of systems operating at 360 Hz to 3000 Hz are presented. (ERA citation 05:013734)

N80-20865/5 PC **A09**/MF **A01**
Honeywell, Inc., Minneapolis, MN.
Solar Energy Heating System Design Package for a Single-Family Residence at New Castle, Pennsylvania.
Aug 77, 187p NASA-CR-161356
Contract NAS8-32093
Prepared for DOE.

The design of a solar heating and hot water system for a single family dwelling is described. Cost trade studies on the energy conservation and architectural features of the solar house are discussed. The present status of verification for the single family heating system, i.e., proof that the components and the system meet applicable physical

and functional requirements, is reported. The system integration drawings, the major subsystems drawings, and the architect's specifications and plans are included.

N80-20866/3 PC **A08**/MF **A01**
Honeywell, Inc., Minneapolis, MN. Energy Resources Center.
Solar Heating System Design Package for a Single-Family Residence at William O'Brien State Park, Minnesota.
Jul 77, 173p NASA-CR-161357
Contract NAS8-32093
Prepared for NASA and DOE.

The plans, specifications, cost trade studies, and verification status of a prototype solar heating and hot water system for the Minnesota Department of Natural Resources's single-family dwelling located at O'Brien State Park, 30 miles east of Minneapolis, Minnesota are presented.

OA-tr-2181 PC **A02**/MF **A01**
Thermal Insulation of New Dwellings: How Do We Obtain a Satisfactory G Factor.
M. Catherineau, and R. Guerin. 25 Oct 75, 9p
A, Moniteur n43 P108-109 25 Oct 1975.
U.S. Sales Only.

The Order issued under Decree No. 74-306 of 10 April 1974 stipulates limits of the volumetric thermal loss factor G for each type of dwelling, detached or otherwise. These limits mean appreciably increasing the thermal insulation currently employed, which is not without some effect on the cost of a building project. To understand the problem of the cost of insulation, or more correctly, the extra cost of insulation generally necessary to improve the volumetric thermal loss factor G, there are different approaches. The first, called the overall method, takes the whole of the building into consideration. The second, or fine method, involving data processing, enables a much more accurate heat balance to be drawn up, apartment by apartment, in accordance with the meaning of the Decree. The general lines of the overall method, are explained. (ERA citation 05:010255)

ORNL/CSD-52 PC **A05**/MF **A01**
Union Carbide Corp., Oak Ridge, TN. Computer Sciences Div.
One Aspect of the Statistical Evaluation of a Computer Model.
K. O. Bowman. Feb 80, 90p
Contract W-7405-ENG-26

The motivation for this research is the need of DOE (and others) for methods and procedures to be used in validating large-scale computational models. Consider a typical example of an energy model developed to predict residential usage at some time t in the future. The problem is to quantify the uncertainty in the prediction. In this example only 109 of the parameters were considered to have non-negligible uncertainty, and standard deviations for these 109 could be assessed. Fifty Monte Carlo runs of the model were made, and the skewness and kurtosis statistics (root b sub 1 and b sub 2) of the resulting empirical distribution calculated. With these and the results of research on their bivariate distribution, the approximate form of the distribution could be identified (Pearson Type I distribution), and from it, the 75% probability regions on the statistics computed. The extremes on the probability region identify extremes of the family of Pearson Type I distributions. A percentile (say the 95th) can be picked off each of the extreme distributions, and thus identify an interval for energy usage. Thus, one can say that there is 75% certainty that 95% of energy usage predictions will be less than some number in the interval. Background theoretical material for the basic statistical methodology is described in the appendixes. (ERA citation 05:013754)

ORO-5552-T7 PC **A07**/MF **A01**
Auburn Univ., AL. Dept. of Mechanical Engineering.
Improving the Efficiency, Safety, and Utility of Woodburning Units. Quarterly Report No. WB-6.
T. T. Maxwell, D. F. Dyer, and G. Maples. 15 Mar 79, 127p
Contract EC-77-S-05-5552

This report describes the work completed during the period December 15, 1978 to March 15, 1979. Work has continued on all phases of the project. Tests have been performed to determine the effects of wood type, wood piece spacing and baffling on the efficiency and heat output of woodburning stoves. The research team has assisted the Fireplace Institute in developing performance standards for use in a rating program for woodburning appliances. Comparative tests have been conducted to verify that the test methods described in these standards are accurate and repeatable, and hence, will provide the basis for a credible rating program. These standards have now been accepted by the industry and the rating program will get underway in late April or early May. One phase of this project is to study creosote, in particular, the parameters that influence the formation of creosote. Due to the intense interest by the industry, the creosote work has been extended to include experimental and analytical thermal analyses of flues and chimneys during a creosote fire. The research team continues to transmit results and information to the woodburning industry. (ERA citation 05:012088)

PAT-APPL-6-125 005 PC **A02**/MF **A01**
Department of the Navy Washington DC
Single Stage Twin Piston Cryogenic Refrigerator.
Patent Application,
Donald B. Sullivan, and James E. Zimmerman.
Filed 27 Feb 80, 18p AD-D007 145/6
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A single stage, twin piston cryogenic refrigerator for cooling superconducting devices. The refrigerator uses helium as the heat transfer medium and is constructed with two nested, concentric pistons, an inner piston and an outer piston, mounted in a cylinder and driven 90% out of phase by a common crankshaft. The inner piston extends through and below the outer piston and is received in a stationary insert mounted in the cylinder. The outer piston has a first piston face which forms a compression space with the stationary insert while the inner piston has a second piston face which forms an expansion space with the cylinder and the insert. The inner piston is formed with upper and lower piston halves joined by a flexible joint positioned in the compression space. Cylindrical regenerator gaps are present at the interface of the inner piston with the stationary insert and at the interface of the stationary insert with the cylinder. (Author)

PB80-165699 PC **A02**/MF **A01**
Electricity Council Research Centre, Capenhurst (England).
The Preparation and Use of Gas Injectors for Ferrous and Non-Ferrous Channel Injection Furnace Applications,
W. H. Fletcher. Dec 79, 15p ECRC/M-1298

This memorandum describes the range of injectors available to applications of gas injection for channel furnaces, and outlines the method of injector preparation and the components/refractories required. A selection of casting moulds are available from the Research Center to allow customers to manufacture the injectors.

PB80-166333 PC **E02**/MF **E02**
Building Research Station, Watford (England).
The Efficiency of Domestic Hot Water Production Out of the Heating Season.
Current papers,
G. E Whittle, and P. R Warren. c1978, 30p CP-44/78

This paper compares the efficiencies of the main methods of providing domestic hot water out of the heating season. These include systems based upon appliances designed solely for water heating and also systems employing central heating boilers, which when supplying hot water only will be operating well below their design rating. Results are presented for an immersion heater, a gas circulator, a multipoint instantaneous gas water heater and five central heating appliances, four fired by gas and one by oil, and are used to discuss the effect on performance of appliance characteristics and methods of control. These studies are intended to provide a basis for decisions on the choice of appliance, controls and system characteristics for domestic water heating, and, consequently, to contribute to a reduction in future domestic energy consumption.

PB80-166341 PC **E02**/MF **E02**
Building Research Station, Watford (England)
Field Studies of the Use of Artificial Lighting in Offices.
Current papers,
D. R. G. Hunt, and A.H. Cockram. c1978, 60p CP-47/78

Part 1 of this report describes field studies aimed at measuring the actual use of artificial lighting in offices in relation to the time of day, time of year, daylight illuminance, daylight factor and design illuminance, in order to provide data for calculations of energy savings based on current patterns of use. Part 2 of the report discusses methods of calculating possible energy and financial savings from the use of photoelectrically controlled systems.

SAN-1329-4(V.1) PC **A04**/MF **A01**
Desert Hot Springs, CA.
Direct Use Applications of Geothermal Resources at Desert Hot Springs, California. Final Report, May 23, 1977-July 31, 1978. Volume I: Summary of Findings.
C. C. Christiansen. Jul 78, 65p
Contract EG-77-C-03-1329

The geothermal resources underlying the City of Desert Hot Springs were described in terms of anticipated geophysical, geochemical, and hydrological characteristics, based upon existing well log data, geologic surveys, and limited wellflow tests. The needs of the City were determined on the basis of its general plan, the City's 1976 census, load survey and a public acceptance survey. Then a broad range of potential nonelectric applications was surveyed in individual as well as energy cascading systems to identify the matchup of the resource and needs of the city. Applications investigated included space conditioning, space/water heating, car wash, agriculture/horticulture, and aquaculture operations. The list of applications so derived was assessed in light of technological, socio-economic, environmental, institutional, and market considerations to determine target opportunities for DHS as well as on a broad regional basis. Those systems which survived the initial screening were subjected to detailed parametric studies focused on determining tradeoffs among performance, cost, size, compatibility with off-the-shelf hardware, etc. A detailed analysis of the engineering and economic aspects of the most promising systems was then performed. Factors considered included technological problems and risks, status of supporting technologies, net energy ratios, costs, market, displacement of fossil fuels, and economic benefit to the community. (ERA citation 05:013437)

SAN-1510-1 PC **A04**/MF **A01**
Michaud, Cooley, Hallburg, Erickson, and Associates, Inc., Minneapolis, MN.
Solar Heating System for the First Baptist Church, 1500 E. Melgaard Road, Aberdeen, South Dakota 57401. Final Report.
H. E. Salem. 16 Apr 79, 66p
Contract EG-77-A-03-1510

This report includes the following: (1) acceptance test plan, (2) systems performance data, (3) pictures of completed system, (4) problems in building the system, (5) description of the system, (6) major maintenance problems, (7) revised blueprints, (8) installation, operation, and maintenance manuals, and (9) recommendations. (ERA citation 05:013359)

SAN-1598-1 PC **A04**/MF **A01**
Honeywell, Inc., Minneapolis, MN. Energy Resources Center.
Solar Energy Management Systems Development Program. Final Report.
55p
Contract EG-77-C-03-1598

This document describes the requirements of a general-purpose solar controller, the novel control system, and sample application of that system.

The investigation showed that solar systems vary in terms of temperature setpoints and differentials. Also, system design details, such as the particular placement of temperatur sensors, lengths or types of ducts, etc., affect setpoint and differential values, even for systems with similar mechanical schematics. (ERA citation 05:009965)

SERI/TR-351-481 PC **A02**/MF **A01**
Solar Energy Research Inst., Golden, CO.
Applications and Systems Studies for Solar Industrial Process Heat.
K. C. Brown. Jan 80, 17p
Contract EG-77-C-01-4042

The program has been highlighted by the development of analytical computer programs, engineering case studies in specific industries, applications and market studies and the assessment of operating experience in actual solar installations. For example, two analytical computer codes (known as PROSYS and ECONMAT) have been assembled and used for the large-scale matching of industrial processes with different types of solar equipment. Verification of the results of this large-scale matching have resulted in a program of detailed case studies of solar and conservation options in local dairies, metal can manufacturing plants, meatpacking plants, and other factories. (ERA citation 05:013370)

SERI/TR-354-245 PC **A06**/MF **A01**
Solar Energy Research Inst., Golden, CO.
Residential Solar Energy Users: A Review of Empirical Research and Related Literature.
C. T. Unseld, and R. Crews. Dec 79, 109p
Contract EG-77-C-01-4042

This report reviews 15 empirical studies of residential solar energy users and related literature on residential solar energy use. The purpose of the review is to summarize and analyze the experiences of residential solar users for helping formulate policies concerning the accelerated commercialization of solar technologies. Four of the studies employed case histories or focus group techniques. The 11 questionnaire studies represented interviews with over 1,600 owners of solar systems. The demographic characteristics of samples are listed and compared; research findings and conclusions are presented. Findings on user satisfaction and system performance, possible reasons for evidence of lacking correlation between them, and implications for consumer protection and future research are discussed. General findings are: (1) systematic research on the experiences of solar users is lacking - much research remains to be done; (2) the reported overall experiences of users has been very positive; (3) user reports indicate that system performance is generally good but there is some evidence that user reports are not accurate measures of actual performance; (4) a need exists for adequate consumer protection; (5) design or installation problems are evidenced in significant numbers of early solar installations; and (6) these problems evidently are resolvable. An annotated bibliography describes 10 other studies in progress. (ERA citation 05:013241)

UCRL-83458 PC **A02**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Solar-Assisted Heat Pump-Swimming Pool Synergistics for Domestic Heating.
T. R. Galloway. Oct 79, 11p CONF-800101-1
Contract W-7405-ENG-48
Systems simulation and economics analysis conference, San Diego, CA, USA, 23 Jan 1980.

In this study for a 150m exp 2 home, clear performance and economic advantages are shown for a solar-assisted heat pump, providing domestic hot water and space heating and cooling, when the pump uses a year-round solar-heated swimming pool as a large thermal energy reservoir. The pool can cycle seasonably between 18 and 31 exp 0 C (64 and 88 exp 0 F), allowing year-round swimming, and provide an excellent water source for the heat pump and low cost, low temperature plastic solar panels operating at their near-optimum efficiency. The system has been optimized by examining the performance and cost characteristics of different glazed and unglazed solar panel collector (areas from 28 to 150m exp 2 and orientation from horizontal to 60 exp 0 tilt) for sites in San Francisco Bay Area and in San Joaquin Valley. Actual experimental data has been used whenever possible, together with numerical simulations for performance. The optimum system was found to use 75m exp 2 of $44/m exp 2 unglazed collector at 48 exp 0 tilt, a 300 GJ/year (30,000 Btu/h) capacity heat pump, and a standard size swimming pool with a solar blanket cover. Solar energy supplied about 85% of the energy requirements at $6.62/GJ ($6.62/10 exp 6 Btu) in July 1979 dollars. With 20 year financing (10% interest), the payout period (re-breakeven) was projected at 7 years and net savings in year 2000 at $42,701 (using the California State Tax Credit) compared against a conventional all-natural gas system. Discounting these savings back to July 1979, the present value of $6,350 would be equivalent to a 9.5% return on investment. (ERA citation 05:009963)

13B. Civil Engineering

AD-A082 469/8 PC **A05**/MF **A01**
Army Engineer District Philadelphia PA
Detailed Project Report. Small Beach Erosion Control Project. Broadkill Beach, Delaware.
Feb 72, 96p

The purpose of this report is to present the results of a study made to determine the economic and engineering feasibility of restoring and stabilizing a portion of the shoreline of Broadkill Beach by providing beach erosion control measures that would result in a recreational beach adequate to meet the present and future needs of the area.

AD-A082 502/6 PC **A03**/MF **A01**
Construction Engineering Research Lab (Army) Champaign IL
Tertiary Treatment of Wastewater Using a Rotating Biological Contactor System.
Final rept.,
Edgar D. Smith, C. P. C. Poon, Walter Mikucki, and John T. Bandy. Feb 80, 43p Rept no. CERL-TR-N-85

The use of rotating biological contactors (RBCs) to upgrade sewage treatment plants is relatively new in the United States, and only a few full-scale RBC secondary plants have been in operation for more than 1 year. RBCs appear to be simple to operate and maintain, cost competitive, reliable, economical, and compatible for retrofitting existing Department of Army (DA) sewage treatment plants without extensive renovation. However, data are scarce regarding RBC retrofitting strategies for upgrading existing secondary trickling-filter sewage treatment plants for additional biochemical oxygen demand (BOD) and nitrogen removal to meet current and anticipated National Pollution Discharge Elimination System (NPDES) requirements. In addition, because of differences in manufacturers' inherent design philosophies, nowell-defined theory of design and operation is accepted by all manufacturers. The overall objective of this investigation was to evaluate the performance of an RBC wastewater treatment process as an upgrading-retrofit unit process for BOD reduction and nitrification. Using a 0.5-m RBC plant at an existing full-scale trickling-filter plant, the flexibility, feasibility, and characteristics for BOD reduction and nitrification potential were determined under a variety of hydraulic, organic, and ammonia-loading regimes. The design procedure is presented, along with design calculations for 1.0, 5.0, and 7.5 mgd plants. Capital costs and energy requirements for these plants at various options were listed for comparison. These results indicate that DA sewage treatment plants can be effectively upgraded.

AD-A082 506/7 PC **A07**/MF **A01**
Calspan Corp Buffalo NY Environmental Systems Dept
Investigation of Methods for Determining Optimum Powdered Carbon and Polyelectrolyte Dosages in Military Wastewater Treatment Systems.
Final rept. 15 Feb-15 Nov 73,
Lawrence K. Wang. Nov 73, 127p Rept no. CALSPAN-ND-5296-M-5
Contract DAAK02-73-C-0206
See also rept. nos CALSPAN-ND-5296-M-1, AD-A077 350 and CALSPAN-ND-5296-M-2, AD-A077 198.

Physical and chemical characteristics of wastewaters generated by typical field laundries, showers, and kitchens were compiled. Previous investigations of the use of carbon and polymers in the treatment of wastewaters with characteristics similar to those generated at military bases were surveyed and assessed Laboratory investigations were conducted to optimize the controlling parameters of a wastewater treatment system involving powdered carbon adsorption, polymer coagulation and diatomite filtration. The mechanisms of the treatment system were also researched and presented. Analytical studies were conducted to develop the methods and a field test kit necessary for determining the nature and concentration of pollutants likely to be present in wastewater generated at field laundries, showers, and kitchens. The test method and the test kit developed are designed for use in the field by military personnel with limited training to provide guidance for determining the optimum carbon-polymer dosages. Instructions and examples for chemical dosage determination were also provided. (Author)

AD-A082 529/9 PC **A04**/MF **A01**
Army Engineer District Philadelphia PA
New Jersey Coastal Inlets and Beaches, Study of Sandy Hook to Island Beach State Park.
Rept. no. 4, (Final).
Jul 78, 53p

A study of the navigation, beach erosion, and storm protection problems and needs for the area along the Atlantic Coast of New Jersey from Sandy Hook to Island Beach State Park was undertaken. The existing Federal navigation projects Manasquan River and Shark River were found to provide deep, well stabilized channels for commercial and recreational boats. However, erosion was found to have seriously reduced the width of beaches in the study area subjecting public and private property to storm damage. A summary of project economics for storm measures is presented. (Author)

AD-A082 636/2 PC **A08**/MF **A01**
Army Engineer Waterways Experiment Station Vicksburg MS Hydraulics Lab
Erosion Control of Scour during Construction. Report 1. Present Design and Construction Practice.
Technical rept. 1 Oct 77-31 May 79,
Lyndell Z. Hales. Mar 80, 160p Rept no. WES/TR/HL-80-3

It is frequently necessary to construct large engineering works of improvement in the surf and nearshore zone to protect harbor entrances, recreational beaches, and navigation channels. Shallow-water surface-gravity waves breaking on the structure during construction will cause bottom material to be suspended and transported from the region by longshore or other currents that may exist. This removal of material is often not compensated by an influx of additional material, and the result is a scour hole, or erosion, which usually develops along the toe of the structure. In order to ensure structural stability and functional adequacy of the works of improvement, any scour area must be filled with nonerosive material (sufficiently stable to withstand the environmental forces to which it will be subjected). This may result in additional quantities of material being required during construction which can potentially lead to substantial cost overruns. The objective of this study is to develop techniques to minimize and control scour during nearshore construction, and to predict the probable magnitude of scour that may result as a function of the wave climate.

AD-A082 666/9 MF **A01**
Woodward-Clyde Consultants Plymouth Meeting PA
National Dam Inspection Program. SCS PA 477 (NDS I.D. Number PA 00720, DER I.D. Number 6-457), Delaware River Basin, Tributary of Mill Creek. Berks County, Pennsylvania. Phase I Inspection Report,
John Henry Frederick, Jr., and Mary F. Beck. Jan 80, 90p
Contract DACW31-80-C-0018
Original contains color plates: All DTIC and NTIS reproductions will be in black and white.
Availability: Microfiche copies only.

SCS PA 477 is a 52-foot-high, 1,550-foot-long dam. The embankment contains an impervious core constructed over a cutoff trench under the

dam centerline. About 1,270 feet of the embankment is roughly parallel to U.S. Route 22/Interstate 78. The remaining 280 feet of the embankment forms an angle of about 60 degrees with the highway. The shorter leg contains the maximum section and the principal spillway. The principal spillway consists of a concrete drop inlet riser, a 222 foot long, 30 inch reinforced concrete pipe with eight anti-seep collars, and an impact basin. The emergency spillway was excavated through rock at the right abutment. The grass-lined trapezoidal channel is approximately 150 feet wide and 30 feet wide. The dam and its appurtenant facilities are considered to be in good condition. Calculations indicate that the existing spillway systems are capable of passing the Probable Maximum Flood (PMF) without overtopping. Therefore, the spillway system is considered to be adequate.

AD-A082 667/7 MF **A01**
Woodward-Clyde Consultants Plymouth Meeting PA
National Dam Inspection Program. SCS PA-476 (NDS-I.D. Number PA 00719, DER I.D. Number 6-456), Delaware River Basin, Tributary of Mill Creek, Berks County, Pennsylvania. Phase I Inspection Report,
John Henry Frederick, Jr., and Mary F. Beck. Jan 80, 91p
Contract DACW31-80-C-0018
Original contains color plates: All DTIC and NTIS color reproductions will be in black and white.
Availability: Microfiche copies only.

SCS PA 476 Dam is a 46-foot-high zoned-earth embankment about 400 feet long. The principal spillway consists of a concrete drop inlet riser, 182 feet of 24 inch reinforced concrete pipe with six anti-seep collars, and an impact basin. The reservoir drain is a 12-inch corrugated metal pipe. The dam and its appurtenant facilities are considered to be in good condition. Calculations indicate that the existing spillway systems are capable of passing the Probable Maximum Flood (PMF) without overtopping. Therefore, the spillway system is considered to be adequate.

AD-A082 668/5 MF **A01**
Woodward-Clyde Consultants Plymouth Meeting PA
National Dam Inspection Program. Railroad Creek Dam (NDS ID Number 01062, DER ID Number 9-175, SCS Number PA 615), Delaware River Basin, Tributary to West Branch Neshaming Creek, Bucks County, Pennsylvania. Phase I Inspection Report,
Mary F. Beck, and John H. Frederick, Jr. Jan 80, 105p
Contract DACW31-80-C-0018
Original contains color plates: All DTIC and NTIS reproductions will be in black and white.
Availability: Microfiche copies only.

Railroad Creek Dam is a 34-foot-high zoned earth embankment about 1,170 feet long with an emergency spillway at the left end of the embankment. The embankment contains an impervious core constructed over a cutoff trench under the dam centerline. The principal spillway consists of a concrete drop inlet riser, 202 feet of 30 inch diameter reinforced concrete, steel cylinder pressure pipe, with seven anti-seep collars and an impact basin at the downstream toe. The reservoir drain is located at the base of the riser. Because of high pressure gas lines which cross the reservoir area, the pond drain gate is not closed and water is not normally impounded behind the dam. The emergency spillway is a trapezoidal channel excavated around the left end of the embankment. The dam and its appurtenant facilities are considered to be in good condition. Calculations indicate that the existing spillway systems are capable of passing the Probable Maximum Flood (PMF) without overtopping. Therefore, the spillway system is considered to be adequate.

AD-A082 669/3 MF **A01**
Berger Associates Inc Harrisburg PA
National Dam Inspection Program. Wangaum Falls Dam (NDI Number PA-00141 DER Number 64-102), Delaware River Basin, Wayne County, Pennsylvania. Phase I Inspection Report.
Mar 80, 100p
Contract DACW31-80-C-0019
Original contains color plates: All DTIC and NTIS reproductions will be in black and white.
Availability: Microfiche copies only.

Wangaum Falls Dam is an earthfill dam with an embankment length of 310 feet and a maximum fill height of 30 feet. The structure has two spillways. One at the left abutment, which is the old spillway, has been reconstructed and raised several times. The second spillway was added in 1956 and is located in the right abutment. Both spillways have a bridge for vehicle access to a home on the right bank of the reservoir. The left spillway has a vertical slot closed off with vertical boards (stoplogs). Removal of these boards could lower the reservoir to about 7 feet below spillway weir elevation. There are no other drawdown or control facilities for this dam. Heavy riprap protects the upstream slope and a stoned surface roadway is on top of the embankment. The embankment was breached several times by floods prior to the reconstruction in 1956. Based on the visual inspection, past performance and the available engineering data, the dam and its appurtenant structures appear to be in fair condition. The spillway capacity is inadequate to pass the PMF peak inflow without overtopping the dam. The dam is capable of passing 70 percent of the PMF, and is considered to be inadequate, but not seriously inadequate.

AD-A082 670/1 MF **A01**
Berger Associates Inc Harrisburg PA
National Dam Inspection Program. SCS Dam PA-445 (NDI Number PA-00099 DER Number 64-176), Delaware River Basin, Wayne County, Pennsylvania. Phase I Inspection Report.
Mar 80, 70p
Contract DACW31-80-C-0019
Original contains color plates: All DTIC and NTIS reproductions will be in black and white.
Availability: Microfiche copies only.

This flood control dam consists of a 550-foot-long homogeneous earthfill embankment with a maximum height of 31 feet above the streambed. The structure has two spillways. The principal spillway is a drop inlet structure and discharges through a 24-inch diameter pipe. An emergency spillway is constructed in the left abutment. This spillway consists of a grassed earth channel with a bottom channel width of 75 feet. The emergency spillway crest was designed to be 3.5 feet below the top of the dam. Based on the visual inspection, past performance and the available engineering data, the dam and its appurtenant structures appear to be in good condition. The spillway capacity is adequate for passing the full PMF peak inflow without overtopping the dam.

AD-A082 671/9 MF **A01**
Berger Associates Inc Harrisburg PA
National Dam Inspection Program. SCS Dam PA-451 (NDI Number PA-01031 DER Number 64-197), Delaware River Basin, Wayne County, Pennsylvania. Phase I Inspection Report.
Mar 80, 75p
Contract DACW31-80-C-0019
Original contains color plates. All DTIC and NTIS reproductions will be in black and white.
Availability: Microfiche copies only.

This flood control dam consists of a 300-foot-long, zoned earthfill embankment with a maximum height of 15 feet above the streambed. The structure has two spillways. The principal spillway is a drop inlet structure and discharges through a 30-inch diameter pipe. An emergency spillway is constructed in the right abutment. This spillway consists of a grassed earth channel with a bottom channel width of 60 feet. The emergency spillway crest was designed to be 5 feet below the top of the dam. Based on the visual inspection, past performance and the available engineering data, the dam and its appurtenant structures appear to be in good condition. The spillway capacity is able to pass the full PMF peak inflow without overtopping the dam, and is considered to be adequate.

AD-A082 672/7 MF **A01**
Berger Associates Inc Harrisburg PA
National Dam Inspection Program. SCS Dam PA-419 (NDI Number PA-00086 DER Number 64-170), Delaware River Basin, Wayne County, Pennsylvania. Phase I Inspection Report.
Mar 80, 73p
Contract DACW31-80-C-0019
Original contains color plates: All DTIC and NTIS reproductions will be in black and white.
Availability: Microfiche copies only.

This flood control dam consists of a 420-foot-long homogeneous earthfill embankment with a maximum height of 29 feet above the streambed. The structure has two spillways. The principal spillway is a drop inlet structure and discharges through a 24-inch diameter pipe. An emergency spillway is located in the right abutment. This spillway consists of a grassed earth channel with a bottom channel width of 41 feet. The emergency spillway crest is 5 feet below the top of the dam. Based on the visual inspection, past performance and the available engineering data, the dam and its appurtenant structures appear to be in good condition. The spillway capacity is adequate to pass the PMF peak inflow without overtopping the dam, and is considered to be adequate.

AD-A082 673/5 MF **A01**
Berger Associates Inc Harrisburg PA
National Dam Inspection Program. SCS Dam PA-452 (NDI-ID Number PA-00100) (DER-ID Number 64-177), Delaware River Basin, Wayne County, Pennsylvania. Phase I Inspection Report.
Mar 80, 69p
Contract DACW31-80-C-0019
Original contains color plates: All DTIC and NTIS reproductions will be in black and white.
Availability: Microfiche copies only.

This flood control dam consists of a 1000-foot-long earthfill embankment with a maximum height of 25 feet. Seven hundred fifty feet of the embankment crosses the valley, the other 250 feet ties the embankment to higher ground in the left abutment. The principal spillway is a drop inlet structure with an orifice opening and discharges through a 30-inch diameter pipe. This spillway is designed to handle a 100 year flood. For any larger floods the emergency spillway is required. This grassed earth spillway is located in the right abutment and has its design crest elevation 4.6 feet below the top of embankment. The emergency spillway has a channel bottom width of about 60 feet. Based on the visual inspection, past performance and the available engineering data, the dam and its appurtenant structures appear to be in good condition. The spillway capacity is adequate to pass the PMF peak inflow without overtopping the dam.

AD-A082 674/3 MF **A01**
Woodward-Clyde Consultants Plymouth Meeting PA
National Dam Inspection Program. Oxford Valley Mall Dam (NDS-ID Number PA-00801, DER-ID Number 9-171), Delaware River Basin, Queen Ann Creek, Bucks County, Pennsylvania. Phase I Inspection Report.
Jan 80, 87p
Contract DACW31-80-C-0018
Original contains color plates: All DTIC and NTIS reproductions will be in black and white.
Availability: Microfiche copies only.

Oxford Valley Mall Dam is a homogeneous earth embankment about 1,200 feet long. The height, measured from the top of the embankment to the toe of the impervious fill, is about 27 feet. However, fill extending from the embankment to U.S. Route 1, a distance of about 850 feet, has reduced the apparent height of the embankment to about 13 feet. The eight acre reservoir was formed by excavation to the elevation of the reservoir drain inlet. The spillway consists of an octagonal reinforced concrete intake tower, 851 feet of an eight foot wide by eight foot high conduit and a transition section at the outlet. The dam and reservoir are used to control storm water runoff from the adjacent Oxford Valley Mall. The dam and its appurtenant facilities are considered to be in generally good condition. Calculations indicate that the existing spillway system discharges about 46 percent of the Probable Maximum Flood (PMF) without overtopping. It is assessed that the embankment would probably withstand overtopping for a limited period. Therefore, the spillway system of this structure is considered to be inadequate but not seriously inadequate.

AD-A082 690/9 PC **A05**/MF **A01**
Woodward-Clyde Consultants Plymouth Meeting PA

National Dam Inspection Program. Martins Dam, (NDS ID-PA-00620, DER ID-46-145), Delaware River Basin, Crow Creek (Abrams Run), Montgomery County, Pennsylvania. Phase I Inspection Report.
Jan 80, 78p
Contract DACW31-80-C-0018
Original contains color plates: All DTIC and NTIS reproductions will be in black and white.

Martins Dam is an earth and masonry dam about 22.5 feet high and 260 feet long. Very limited data exists regarding the physical features of the dam. The dam was overtopped in September 1979, during Hurricane David, washing away a considerable portion of downstream rock fill at the maximum section and exposing the dry masonry interior of the dam, originally the downstream face of the dam. Erosion had also taken place at the left and right downstream abutment junctions, and a corrugated metal spillway extension was washed away. The spillway is located at approximately the mid-point of the dam and discharge flows through a 36 inch diameter steel pipe. The dam and its appurtenant facilities are considered to be in fair condition. Calculations indicate that the existing spillway system is not capable of passing about 0.1 PMF (Probable Maximum Flood) without overtopping. It is assessed that 0.5 PMF would cause failure and significantly increase the potential for excessive property damage and loss of life in the major downstream damage center, King of Prussia Mall. Therefore, the spillway system of this structure is considered to be seriously inadequate, and the dam is in an 'unsafe, nonemergency condition.

AD-A082 711/3 PC **A08**/MF **A01**
Coast Guard Washington DC Office of Merchant Marine Safety
Report to the President on an Evaluation of Devices and Techniques to Improve Maneuvering and Stopping Abilities of Large Tank Vessels.
Final rept.,
James C. Card, H. Paul Cojeen, John S. Spencer, and James P. Harmon. Sep 79, 174p
Rept no. USCG-M-4-79

This report is the final in a series of five that were initiated by the President in his 17 March 1977 message to Congress on the reduction of marine oil pollution. The report presents the basic definitions of maneuvering and stopping abilities and an assessment of the maneuvering and stopping abilities of existing tank vessels as a function of deadweight, compared to those of dry cargo vessels. Using the methods for evaluating maneuvering abilities that are outlined, various devices that have been proposed were examined. The initial evaluation was based on the degree of improvement in the maneuvering ability, the cost and the effect on the design of the vessel for each device. A mathematical (simulation) model was employed to further evaluate the most promising devices. A description of each operational technique has been included. The evaluation of the operational techniques was performed primarily by reporting on various full scale tests. The findings indicate that good maneuvering characteristics can be achieved for tank vessels, but without some guidance or requirement, this is not generally considered in the design cycle for new ship construction. (Author)

AD-A083 020/8 PC **A05**/MF **A01**
Army Military Personnel Center Alexandria VA
Removal of Grease from Secondary Effluent by Granular Medium Filtration.
Final rept.,
Kurt Arthur Schaefer. 24 Mar 80, 86p
Master's thesis.

The presence of grease in the effluent of secondary wastewater treatment plants is a source of pollution. As such, its removal is desirable. The ability of sand filters, as used in tertiary treatment, to remove grease from secondary effluent is examined in this study. A mixture of secondary effluent and oleic acid, which was added to enhance the grease content of the effluent, was filtered through three high pressure sand filters. During the first stage of the experiment the flowrate through the filters was held constant and the size of the medium was varied. During the second stage the medium size was constant and the flowrate was varied. Samples of the filter influent and effluent were taken and analyzed using a Total Carbon analyzer. (Author)

ANL/CEN/FE-79-9 PC **A04**/MF **A01**
Argonne National Lab., IL.
Regeneration of Sulfated Limestone from FBCs. Quarterly Report, April-June 1979.
I. Johnson, D. S. Moulton, F. F. Nunes, E. B. Smyk, and W. M. Swift. 1979, 52p
Contract W-31-109-ENG-38

These studies are concerned with the development of processes for the regeneration of sulfated limestone from fluidized-bed combustors. The results of cyclic combustion/regeneration experiments on two limestones are reported. In these studies the behavior of a low reactivity limestone, Germany Valley, during cyclic combustion/regeneration was studied; regeneration did not significantly change its reactivity. Studies of a high reactivity limestone, Greer, at lower (1050 exp 0 C vs 1100 exp 0 C) regeneration temperatures indicated an apparent improvement in performance. The mass and energy balance-constrained model for the continuous combustion-regeneration process was modified to allow more complete specification of the sorbent properties. The results of studies of a process for the recovery of elemental sulfur from SO sub 2 involving reaction with fly ash or coal ash-coal combinations are reported. The residual carbon in the fly ash was found to be an effective reductant for the SO sub 2 and high purity sulfur was obtained. (ERA citation 05:011186)

ANL/EES-TM-72 PC **A04**/MF **A01**
Argonne National Lab., IL.
Assessment of the Local Air Quality Impacts of Increased Coal Use Resulting from Implementation of the National Energy Plan.
D. A. Kellermeyer, and E. P. Levine. Aug 79, 65p
Contract W-31-109-ENG-38

The National Energy Plan (NEP) contains a number of national energy goals that may come into conflict with national air quality goals as stated in the Clean Air Act Amendments of 1977 (CAAA). This report provides a preliminary assessment of air quality impacts resulting from the increased coal consumption aspects of the NEP. Specifically, the implications of changes in local concentrations of sulfur doxide (SO sub 2), total suspended particulates (TSP), and nitrogen dioxide (NO sub 2) were analyzed for the years 1985 and 1990. Counties containing or projected to contain post-1975 coal use by either utilities or major industries were examined to determine if the amount of coal use projected would lead to violation of prevention of significant deterioration (PSD) regulations or National Ambient Air Quality Standards (NAAQS). The report findings are summarized for both the national and regional levels. (ERA citation 05:011123)

ANL/ES-78 PC **A03**/MF **A01**
Argonne National Lab., IL.
Simulation of Waste Treatment (SWAT) Model: A Method for Cost-Effectiveness Analyses of Wastewater Treatment Strategies.
C. M. Macal. Dec 78, 47p
Contract W-31-109-ENG-38

A computer simulation model for estimating municipal wastewater treatment costs, referred to as SWAT (Simulation of Waste Treatment) model is described. The model can be used as a policy planning tool to construct relationships between cost and effluent quality across technologies for a river basin. Wastewater treatment technology is represented in detail. Costs of operation and modification in response to changes in effluent standards are simulated over a planning period. Replacement technology at the time of plant modification is selected automatically by the model considering the equipment in place at a plant and costs of alternate technologies. The model is unusual in that the interactions of pollutant treatments are explicitly considered and information on the existing treatment systems in a basin is taken into account. An analytical framework is presented to illustrate how the model represents treatment technology and estimates costs. The model's capabilities are discussed and sample output is presented to show how the SWAT model can be used as a policy planning tool. (ERA citation 05:012139)

ANL/LRP-TM-15 PC **A04**/MF **A01**
Argonne National Lab., IL.
Characterization of Three Acid Strip Mine Lakes in Grundy County, Illinois.
W. A. Master. Sep 79, 69p
Contract W-31-109-ENG-38

Three small lakes with acid water and one with circumneutral water at an abandoned strip mine site were characterized to identify factors limiting biological productivity. Dissolved oxygen, specific conductance, and temperature profiles were determined. Water samples were analyzed for 23 parameters, and the lakes were examined for the presence of aquatic vascular plants and benthic inhabitants. The acid lakes ranged from 0.9 ha to 2.7 ha in surface area and from 3.1 m to 6.7 m in maximum depth. The mean pH of the acid lakes ranged from 3.1 to 3.9. Chemicals found at concentrations higher than Illinois surface water standards or federal criteria for the protection of aquatic life included Cd, Cu, Fe, Mn, SO sub 4 =, and Zn. A number of these chemicals were at sufficiently high concentrations to limit the survival and productivity of most aquatic fauna. The lake with the poorest water quality had the least diversity of aquatic vascular plants and benthic invertebrates, while the circumneutral lake had the greatest diversity of species. (ERA citation 05:012526)

ANL/LRP-4 PC **A06**/MF **A01**
Argonne National Lab., IL.
Staunton 1 Reclamation Demonstration Project. Progress Report II.
Jul 79, 111p
Contract W-31-109-ENG-38

The Staunton 1 Reclamation Demonstration Project involves an evaluation of the reclamation process on a 13.8-ha abandoned deep coal mine refuse site in southwestern Illinois. The procedure included collection of preconstruction environmental data, determination of the site's final land use, and development and implementation of a detailed site development plan. Approximately 9.3 ha of refuse material was recontoured, covered with a minimum of 30 cm of soil obtained on site, and seeded with a mixture of grasses and legumes. Hydrologic investigation indicates some improvement in groundwater quality. Surface water quality also has shown improvement, but development of the aquatic ecosystem in the newly-constructed pond is slow. Revegetation has been successful, and a protective plant cover has been established on most areas of the site. Soil tests indicate that acceptable plant growth media have been constructed; however, continued application of fertilizer and limestone will probably be necessary to maintain the vegetation. The soil microbial community has achieved total numbers equal to those of old fields, but species' diversity is low. Small mammals, birds, reptiles, and amphibians have invaded and are utilizing the site. The economic value of the site and adjacent property has increased substantially, and the area's aesthetic value has been enhanced significantly. The two-year period of intensive monitoring and evaluation has been utilized to develop recommendations for improving the designs of future reclamation efforts. (ERA citation 05:012515)

BMFT-FB-T-79-114 PC **A19**/MF **A01**
Nuklear-Chemie und -Metallurgie G.m.b.H., Hanau (Germany, F.R.).
Systematic Report on the Formation and the Control of Annoying Odor Emissions. Final Report.
P. G. Maurer, H. Brunner, S. Schindler, J. Kastka, and H. Kremer. Dec 79, 428p
In German.
U.S. Sales Only.

The problems connected to the appearances of annoying odor emissions are demonstrated. The following subjects were studied: classification and evaluation of the air pollution by odorous compounds; toxic effects of the odorous compounds; sources of odor emissions; diffusion of odorous compounds in the environment of emission sources; odorous compounds analytical methods; and, odor emissions control methods. (ERA citation 05:012422)

BNL-26892 PC **A02**/MF **A01**
Brookhaven National Lab., Upton, NY.

Atmospheric Stability Comparisons at Shore and Inland Sites.
R. M. Brown, S. SethuRaman, and C. Nagle.
1980, 3p CONF-800107-1
Contract EY-76-C-02-0016
Conference on coastal meteorology, Los Angeles, CA, USA, 30 Jan 1980.

The values needed to predict diffusion and resulting concentrations from sources near coastlines is limited by lack of experimental data at coastal locations. The results obtained in this study are directed to assist in those calculations. Wind measurements made at the coastal site and some comparisons with the measurements made at an inland location, both on Long Island, are presented. Continuous wind speed and direction measurements have been made at the Tiana Beach site since 1975. Hourly averaged wind direction, speed and gustiness types were obtained from these records, and processed by computer techniques. Simultaneous data from the inland location were also obtained. The data were grouped with a digital computer according to gustiness types, windspeed categories and 10 exp 0 wind direction increments from 0 to 360 degrees. The initial analysis was to separate the various gustiness types by the number of occurrences per month at each location. These data were used to determine the ratio of each type to the total monthly hours at each place. The ratios at each location were compared to give some understanding of the differences of total gustiness between the coastal and inland site. (ERA citation 05:012414)

BNL-26929 PC **A02**/MF **A01**
Brookhaven National Lab., Upton, NY.
Atmospheric Oxidation of Sulfur Dioxide.
L. Newman. Oct 79, 22p CONF-791090-4
Contract EY-76-C-02-0016
Symposium on potential environmental and health effects of atmospheric sulfur deposition, Gatlinburg, TN, USA, 14 Oct 1979.

An overview is presented of significant historical, recent, and new power plant and smelter plume studies which have been directed at understanding the atmospheric oxidation of sulfur dioxide. It can be concluded that the average rate of oxidation of sulfur dioxide in plumes entering into clean air is generally less than 1% per hour but in polluted urban air the rate can be at least twice as fast. In addition, there is a diurnal variation in the rate, being near zero at night and approximately 3% during midday. Although there is a tendency to select homogeneous over heterogeneous as the dominant pathway there is no basis for a definitive choice and most likely both mechanisms are at times operative. The suggestion is made that important and definitive new studies can be performed with technologies just becoming available. (ERA citation 05:014157)

BNL-27164 PC **A03**/MF **A01**
Brookhaven National Lab., Upton, NY.
Environmental Control Technology for Atmospheric Carbon Dioxide.
M. Steinberg, and A. S. Albanese. 1980, 31p CONF-800309-1
Contract EY-76-C-02-0016
International workshop on the energy/climate interactions, Munster, F.R. Germany, 3 Mar 1980.

The impact of fossil fuel use in the United States on worldwide CO sub 2 emissions and the impact of increased coal utilization on CO sub 2 emission rates are assessed. The aspects of CO sub 2 control are discussed as well as the available CO sub 2 control points (CO sub 2 removal sites). Two control scenarios are evaluated, one based on the absorption of CO sub 2 contained in power plant flue gas by seawater; the other, based on absorption of CO sub 2 by MEA (Mono Ethanol Amine). Captured CO sub 2 is injected into the deep ocean in both cases. The analyses indicate that capture and disposal by seawater is energetically not feasible, whereas capture and disposal using MEA is a possibility. However, the economic penalities of CO sub 2 control are significant. The use of non-fossil energy sources, such as hydroelectric, nuclear or solar energy is considered as an alternative for limiting and controlling CO sub 2 emissions resulting from fossil energy usage. (ERA citation 05:013523)

BNL-50977 PC **A06**/MF **A01**
Brookhaven National Lab., Upton, NY.

Environmental Programs of the Department of Energy and Environment Annual Highlights.
B. Manowitz. Dec 78, 109p
Contract EY-76-C-02-0016

Environmental Sciences is one of the four areas comprising the Department of Energy and Environment at Brookhaven National Laboratory. It carries out a wide range of activities in atmospheric sciences, environmental chemistry, oceanographic sciences, and land and freshwater environmental sciences. In general, these programs are concerned with identification and measurement of pollutants introduced into the environment by energy-related activities and the evaluation and prediction of the effects or potential effects of these pollutants on the environment. This highlights report for Environmental Programs covers the year 1978 and describes the objectives and funding levels of each of the programs, major accomplishments during the year, planned future activities, and current publications. (ERA citation 05:012415)

BNL-51058 PC **A05**/MF **A01**
Brookhaven National Lab., Upton, NY.
Analytical Summary of Experimental Data from Two Years of Hourly Sequential Precipitation Samples at Brookhaven National Laboratory.
G. S. Raynor, and J. V. Hayes. May 79, 95p
Contract EY-76-C-02-0016

Hourly precipitation samples were collected at Brookhaven National Laboratory from June 1976 through May 1978 with the Brookhaven Automatic Sequential Precipitation Sampler. Conventional meteorological data were recorded for each sample period. The samples were analyzed for pH, conductivity, and concentrations of sulfate, nitrogen, ammonium, sodium, and chloride ions. Ratios of selected ions, excess conductivity above the H exp + contribution, and excess sulfate and chloride above the seawater ratio were calculated and treated as additional variables. Statistical analyses were performed of the relationships between selected chemical variables and between them and meteorological conditions. Rainfall rate was also analyzed in terms of other meteorological variables. Because a number of units were changed after publication of an earlier report (BNL 50826), the results (presented in a series of tables) are given for each year separately and for both years jointly. (ERA citation 05:012482)

CONF-791065-2 PC **A02**/MF **A01**
Argonne National Lab., IL.
Use of Oxygen Isotopy in the Study of SO sub 2 to Sulfates in the Atmosphere.
B. D. Holt, P. T. Cunningham, and R. Kumar.
1979, 8p
Contract W-31-109-ENG-38
WMO symposium on the long-range transport of pollutants and its relation to general circulation including stratospheric/tropospheric exchange processes, Sofia, Bulgaria, 1 Oct 1979.

Previous experimental results have indicated that the exp 18 O/ exp 16 O ratios in water vapor, precipitation water, and sulfate contained in precipitation water vary seasonally (higher in summer, lower in winter), while the exp 18 0/ exp 16 0 ratio in atmospheric particulate sulfate appears to vary randomly with season. The samples were arbitrarily intermittent and therefore did not necessarily represent continuous, temporal variations of the oxygen isotopes, except during the three-day sampling period within each month. It was postulated on the basis of the data obtained, that since the two-year averages of exp 18 0 content in particulate sulfate and precipitation sulfate were about equal, both were probably formed by the same aqueous oxidation mechanism in clouds. In recent studies, sequential seven-day samples of water vapor, particulate sulfate and sulfur dioxide were continuously collected throughout the four seasons. Samples of rain and snow were also collected for most of the precipitation events during this period. The results obtained from this more intensive sampling program give an alternative and possibly more accurate interpretation of the apparent lack of agreement between the isotopic qualities of precipitation and particulate sulfates. Results indicate that SO sub 2 in the atmosphere is converted to sulfate in the late fall, winter, and early spring predominantly by an aqueous oxidation mechanism that yields sulfates isotopically similar, if not identical, to sulfates found in precipitation water: while in the late spring, summer, and early fall, SO sub 2 is converted predominantly by a sun-induced mechanism that yields sulfates more depleted in exp 18 0. The predominating summer mechanism(s) may involve reactions of SO sub 2 with OH radicals or other free radicals, or reactions with photochemically produced aqueous-phase oxidants, such as H sub 2 0 sub 2 . (ERA citation 05:012418)

COO-2730-3(V.1) PC **A05**/MF **A01**
EIC Corp., Newton, MA.
Control of Hydrogen Sulfide Emission from Geothermal Power Plants. Volume I. Summary of Results. Final Report.
F. C. Brown, W. W. Harvey, and R. B. Warren.
1979, 76p
Contract EY-76-C-02-2730

A program of laboratory and pilot plant tests, detailed process and project engineering work, and process engineering and economic evaluation studies has been carried out in support of the design of a test facility for demonstration of the copper sulfate process for the removal of hydrogen sulfide from geothermal steam at turbine upstream conditions. A demonstration plant has been designed which is capable of removing 99% of the H sub 2 S, 90% of the NH sub 3 , and significant amounts of H sub 3 BO sub 3 and particulates from 100,000 lb/hr of geothermal steam of The Geysers composition. Criteria for the mechanical and process design of the scrubber have been confirmed in field tests of fifty hours duration on an eight-inch diameter scrubber at PG and E's Unit No. 7, The Geysers. The background of the problem and the technical approach to its solution, the scope and results of the first-phase laboratory testing, the scope and results of the experimental and analytical studies carried out in the second phase, and a description of the configuration of the demonstration plant and the test plan for its operation are summarized. (ERA citation 05:011752)

COO-2730-3(V.2) PC **A17**/MF **A01**
EIC Corp., Newton, MA.
Control of Hydrogen Sulfide Emission from Geothermal Power Plants. Volume II. Laboratory Results and Process Engineering Evaluation. Final Report.
F. C. Brown, W. W. Harvey, and R. B. Warren.
1979, 388p
Contract EY-76-C-02-2730

Reports on ten different tasks are included. Separate abstracts were prepared for each one. (ERA citation 05:011753)

COO-4043-2 PC **A13**/MF **A01**
Utah Univ., Salt Lake City. Coll. of Engineering.
Analysis of the Environmental Control Technology for Tar Sand Development.
N. de Nevers, B. Glenne, and C. Bryner. Jun 79, 293p
Contract EY-76-S-02-4043

The environmental technology for control of air pollution, water pollution, and for the disposal, stabilization, and vegetation of the waste tar sand were thoroughly investigated. Although some difficulties may be encountered in any of these undertakings, it seems clear that the air and water pollution problems can be solved to meet any applicable standard. Currently there are two large-scale plants producing liquid fuels from tar sands in Alberta, Canada which use similar technology involving surface mining, hot water extraction, and surface disposal of waste sand. These projects all meet the Canadian environmental control regulations in force at the time they began. The largest US deposits of tar sands are much smaller than the Canadian; 95 percent are located in the state of Utah. Their economics do not appear as attractive as the Canadian deposits. The environmental control costs are not large enough to make an otherwise economic project uneconomic. The most serious environmental conflict likely to occur over the recovery of liquid fuels from the US deposits of tar sands is that caused by the proximity of the deposits to national parks, national monuments, and a national recreation area in Utah. These areas have very stringent air pollution requirements; and even if the air pollution control requirements can be met, there may still be adequate opposition to

large-scale mining ventures in these areas to prevent their commercial exploitation. Another environmental constraint may be water rights availability.Essentially all of the water running in the Colorado river basin is now legally allocated. Barring new interpretations of the legality of water rights purchase, Utah tar sands developments should be able to obtain water by purchasing existing irrigation water rights. (ERA citation 05:011283)

COO-4531-6 PC **A06**/MF **A01**
Illinois Inst. of Tech., Chicago.
Beneficial Utilization of Waste Heat from Power Plants in Wastewater Treatment Systems.
S. N. Ni, and A. W. Obayashi. Jun 79, 115p
Contract EC-77-S-02-4531

A number of wastewater treatment processes were analyzed for possible benefit in using waste heat from co-located steam-electric power plants. Three levels of treatment standards were considered, ranging from secondary treatment to stricter tertiary requirements which involve nutrient removal. Three sizes of treatment plants were analyzed, ranging from those serving 33,000 to 2,000,000 population. The processes analyzed included activated sludge, trickling filter, rotating biological contactors and the Bardenpho process. In the study, a fraction of the condenser discharge was considered mixed with primary-treated wastewater, thereby accelerating the biological secondary-treatment processes at the expense of dilution. In each case, the most cost-effective fraction of condenser flow to be utilized was determined. After treatment, a portion of the mixture would be returned to the power plant in order to recycle the corresponding condenser discharge and provide the necessary evaporative makeup for the cooling system. The balance of the mixture would constitute the water product of the treatment plant. The benefit of waste heat used to replace fuel oil in sludge digesters was also analyzed. In the case of the lowest effluent standards (Group 1), the most cost-effective secondary treatment process was activated sludge without waste-heat recycle because it is dominated by non-thermal considerations. Group 2 standards were favored by rotating biological contactors with waste-heat recycle. The most advanced Group 3 standards were optimally met by the Bardenpho process, also with waste-heat recycle. In all cases, anaerobic sludge digestion with waste heat in place of fuel oil was most economical. The overall savings in levelized annual costs ranged from 1.5% for the smallest plants to 9.9% for the largest plants, by using waste heat optimally as compared with optimal systems without waste heat. (ERA citation 05:010299)

DOE/EIS-0050 PC **E05**/MF **E05**
Department of Energy, Washington, DC.
Residential Conservation Service Program. Final Environmental Impact Statement.
Nov 79, 428p

Proposed is the establishment of the Residential Conservation Service Program to implement Part 1 of Title II of the National Energy Conservation Policy Act (P.L. 95 to 619). The proposed program would require large regulated and nonregulated utilities with specified residential sales to prepare and administer programs of consumer information and services, including home energy audits, designed to promote the installation of energy-conservation and renewable-resource measures in residential buildings. Among the energy-conservation measures currently included in the RCS Program are caulking and weatherstripping; certain furnace-efficiency modifications; insulation of ceilings, walls, floors, pipes, ducts, and water heaters; storm windows and doors; thermal windows and doors; and clock thermostats. Among the renewable resource measures currently included are active solar space-heating and hot-water systems; passive solar space-heating and cooling systems; and wind energy devices. The range of alternatives considered for the program includes the scope and duration of post-installation inspections, the scope of installation standards for loose-fill insulation, and a material standard for attic insulation. (ERA citation 05:010249)

DOE/ERA-0021 PC **A08**/MF **A01**
Department of Energy, Washington, DC. Economic Regulatory Administration.
Environment Assessment: Allocation of Petroleum Feedstock, Algonquin SNG Inc., Freetown SNG Plant, Bristol County, MA.
Jan 80, 164p

The proposed administrative action to deny, grant or modify the Algonquin SNG, Inc. (Algonquin) petition for an adjusted allocation of naphtha feedstock may significantly affect the ehuman environment. The volume of feedstock requested is 4,425,571 barrels per year of naphtha to be used in Algonquin's Freetown, MA synthetic natural gas (SNG) plant. Environmental impacts of 100, 78, and 49% allocations were evaluated. (ERA citation 05:011409)

DOE/EV-0064 PC **A07**/MF **A01**
Mittelhauser Corp., Downers Grove, IL.
Wood Combustion Systems: Status of Environmental Concerns.
J. E. Dunwoody, H. Takach, C. S. Kelley, R. Opalanko, and C. High. Jan 80, 132p
Contract W-31-109-ENG-38

This document addresses the uncertainties about environmental aspects of Wood Combustion Systems that remain to be resolved through research and development. The resolution of these uncertainties may require adjustments in the technology program before it can be commercialized. The impacts and concerns presented in the document are treated generically without reference to specific predetermined sites unless these are known. Hence, site-specific implications are not generally included in the assessment. The report consists of two main sections which describe the energy resource base involved, characteristics of the technology, and introduce the environmental concerns of implementing the technology; and which review the concerns related to wood combustion systems which are of significance for the environment. It also examines the likelihood and consequence of findings which might impede wood commercialization such as problems and uncertainties stemming from current or anticipated environmental regulation, or costs of potential environmental controls. This document is not a formal NEPA document. Appropriate NEPA documentation will be prepared after a formal wood combustion commercialization program is approved by DOE. (ERA citation 05:013297)

EML-365 PC **A02**/MF **A01**
Department of Energy, New York. Environmental Measurements Lab.
Submicron Aerosols: A Review.
D. Sinclair. Nov 79, 21p

Submicron aerosols, ranging in particle diameter from 0.1 mu m to 0.001 mu m, and in number concentration from 10,000 to 100,000 per cm exp 3 , are more or less continuously suspended in the atmosphere we breathe. They usually require in situ measurement of concentration and size distribution with instruments such as diffusion batteries and condensation nucleus counters. Laboratory measurements require the development of submicron aerosol generators. The development of several of these devices and their use in the laboratory and field to measure radioactive as well as inactive aerosols is described. (ERA citation 05:014161)

EPRI-EA-872 PC **A06**/MF **A01**
Atomic Industrial Forum, Inc., Washington, DC.
Document Collection of Electric Utility Studies Related to Steam Electric Power Station Cooling System Effects on Water Quality and Aquatic Biota.
E. H. Hannon. Aug 78, 121p

A unique collection of approximately 1200 studies and reports contributed by electric utilities throughout the United States has been documented in one comprehensive bibliography by the Atomic Industrial Forum, Inc. (AIF) under contract to the Electric Power Research Institute (EPRI). The documents cover cooling system thermal and chemical effects, entrainment and impingement and have been abstracted and keyworded in a computer data base available for industry use. The original documents and data base are maintained by the Atomic Industrial Forum's INFORUM Information Service in Washington, DC. (ERA citation 04:026229)

FE/EES-79/8 PC **A03**/MF **A01**
Department of Energy, Morgantown, WV. Process Evaluation Office.
Economic Evaluation of the Coal Oxydesulfurization Process: One Unit Train Per Day of Coal.
W. C. Morel, and T. J. George. Jun 79, 30p

The chemical coal cleaning process, Oxydesulfurization, being developed at the Pittsburgh Energy Technology Center, has been evaluated. A flowsheet for an 11,845-ton-per-day commercial plant has been used as the basis for a preliminary cost study made by the Process Evaluation Office of the Department of Energy. The coal is from the Lower Freeport seam, and the cleaned coal product will meet the May 1978 EPA standards on sulfur emissions for new steam powerplants. Results of the cost study indicate processing charges of $20.43, $23.37, and $28.66 per ton of product assuming 12-, 15-, and 20-percent discounted cash flows (DCF) and 100 percent equity financing. With 33:67 debt-equity financing, again assuming 12-, 15-, and 20-percent DCF rates, the processing charges are $18.47, $20.41, and $23.92, respectively. (ERA citation 05:011042)

FE/EES-79/9 PC **A03**/MF **A01**
Department of Energy, Morgantown, WV. Process Evaluation Office.
Economic Evaluation of the Modified Coal Oxydesulfurization Process: One Unit Train Per Day of Coal.
W. C. Morel, and T. J. George. Jun 79, 29p

The chemical coal desulfurization process, Oxydesulfurization, developed at the Pittsburgh Energy Technology Center, has been modified to include gravity separation of the coal slurry so that only 45 percent of a Lower Freeport coal with favorable characteristics needs to be chemically treated to meet EPA standards in effect May 1978. A flowsheet for a commercial plant to produce 11,740 tons per day of product has been developed and is used as a basis for a preliminary cost study made by the Process Evaluation Office of the Department of Energy. Results of the cost study indicate processing charges of $16.16, $18.49, and $22.69 per ton of product assuming 12-, 15-, and 20-percent discounted cash flows (DCF) and 100 percent equity financing. With 33:67 debt-equity financing, again assuming 12-, 15-, and 20-percent DCF rates, the processing charges are $14.61, $16.51, and $18.93, respectively. (ERA citation 05:011043)

FE-1207-T13 PC **A02**/MF **A01**
Bituminous Coal Research, Inc., Monroeville, PA.
Gas Generator Research and Development, BI-GAS Process. A Study of Ammonia Consuming Bacteria.
Oct 79, 23p
Contract EF-77-C-01-1207

One of the problems encountered in operating the BI-GAS Pilot Plant has been the excessive production of ammonia in the synthesis gas from the gasifier. The contract with the Indiana Borough Sewage Plant limits the concentration of ammonia nitrogen in the wastewater to 25 ppM and total kjeldahl nitrogen to 50 ppM. This report presents some of the problems encountered at the BI-GAS Pilot Plant with ammonia removal from the plant wastewater and the results of a study to consider use of ammonia-consuming bacteria for that purpose. Nitrobac, a special strain of ammonia-consuming bacteria from Polybac Corporation and baker's yeast, were studied for their ability to remove ammonia from plant wastewater. The organism in baker's yeast consumes ammonia nitrogen and uses it in the formation of amino acids in the production of cell materials. Nitrobac, on the other hand, is a nitrifying bacteria and according to Polybac Corporation, is supposed to use ammonia nitrogen as an energy source while converting it to nitrites and nitrates, thus reducing ammonia nitrogen and total kjeldahl nitrogen. Total kjeldahl nitrogen is the sum of inorganic (NH sub 3) and organic nitrogen (amines, etc.), but not nitrate or nitrite nitrogen. The Nitrobac received, did not perform as claimed in converting ammonia to nitrates and nitrites. It was later discovered that a contaminant was consuming ammonia nitrogen in much the same way as yeast.Nitrobac and yeast both consumed ammonia nitrogen, possibly in synthesizing amino acids, only after the addition of various nutri-

ents. In all experiments the total nitrogen remained at a constant level. Since there is also a total kjeldahl nitrogen limitation of 50 ppM for the BI-GAS effluent, this approach to the ammonia removal problem is not recommended. If further study of bacterial removal of ammonia is desired, Nitrosomonas and Nitrobacter bacteria should be obtained in pure cultures for laboratory evaluation. (ERA citation 05:011057)

FE-1207-T14 PC **A02/MF A01**
Bituminous Coal Research, Inc., Monroeville, PA.
Gas Generator Research and Development BI-GAS Process. Use of Calcilox as a Solidification Agent in the Settling Pond.
Oct 79, 19p
Contract EF-77-C-01-1207

Since initial operations began in August 1976 the handling and disposal of fine solids from the BI-GAS Pilot Plant waste disposal pond has been a problem. The fines produced in the coal grinding operation as well as carry over from the coal and char cyclones have particularly aggravated that problem. The contract with the Indiana Borough Sewage Plant limits the amount of solids, in slurry form, it receives to 520 lbs/day. Therefore, coagulants have been used to separate the suspended fines from the wastewater. Periodically, the pond must be emptied as a result of this practice. An effective means of solids disposal is necessary for extended operation of the BI-GAS Pilot Plant and may be necessary for a commerical design. This report presents the results of a laboratory study evaluating the applicability of using Calcilox to stabilize the soupy consistency of the wastewater pond. Calcilox is a calcuim-based chemical, developed by Dravo Corp., that triggers cementatious type reactions entrapping the refuse particles and water in a consolidated soil-like consistency. The results of the testing program substantiates Dravo's claim; however, the amounts of the solid necessary to do the job were considered excessive. The tests evaluated a 20% and a 35% by weight slurry concentration of fines to which Calcilox, in concentrations up to 50% by weight of the fines, was added. Because the process was enhanced in an alkaline environment, lime concentrations up to 3% by weight of the fines, was also added in certain tests. From an evaluation of the data, it is expected that 30 to 50% Calcilox and 2 to 3% lime addition (by weight of the solids contained), would be necessary to effect reasonable stabilization of an initial 35% slurry. Somewhat greater amounts would be necessary at lower slurry concentrations. (ERA citation 05:012984)

FE-2315-34 PC **A03/MF A01**
Chevron Research Co., Richmond, CA.
Refining and Upgrading of Synfuels from Coal and Oil Shales by Advanced Catalytic Processes. Quarterly Report, October-December 1978.
R. F. Sullivan. Jan 79, 42p
Contract EX-76-C-01-2315

Pilot plant tests on the hydrotreating of SRC-II process product indicate that this coal-derived feed is a suitable feed for refining using advanced commercial petroleum processing technology. Experiments are in progress to evaluate several different combinations of refinery processes for conversion of SRC-II to transportation fuels. Nitrogen in the whole SRC-II process product can be reduced to a concentration of less than 0.5 ppM in a single catalytic stage. Sulfur and oxygen can also be reduced to low levels; and at high severity, most of the aromatic compounds are converted to napththenes. The naphtha appears to be an excellent catalytic reformer feed, and the middle distillate meets the smoke point and stability specifications for jet fuel. As the processing severity is decreased, product nitrogen increases; and the product becomes more aromatic. (ERA citation 05:011087)

FE-2346-46 PC **A08/MF A01**
Environmental Research Inst. of Michigan, Ann Arbor.
Environmental Monitoring and Analysis in Support of Antrim Oil Shale Research. Topical Report, March 1978-February 1979.
F. J. Tanis, and G. S. Thomas. May 79, 174p
Contract EX-76-C-01-2346

A program to assess environmental impacts of in situ Antrim oil shale processing experiments was carried out. This report covers the second year of an expected four year program. Activities included: monitoring of surface elevations for possible subsidence; monitoring for soil contamination from brines; monitoring surface and subsurface water quality; and monitoring ambient air quality. Assessment was also made of site vegetation, soils, surface disruption caused by drilling activities, and impacts on neighboring residents. Much of this year's effort was directed to monitoring baseline conditions. Consequently, assessment of potential impacts from in situ operations is not yet possible. However, hydrofracturing operations did not appear to affect surface elevations, and the experimental operations, including flaring of combustion product gases, did not degrade ambient air quality beyond permissible concentrations. Negative impacts noted include minor inconvenience to neighboring residents, ad physical disruption of the land surface. A potential ground water quality problem caused by drilling wastes and/or well seepage from previous operations was identified. (ERA citation 05:011285)

FE-3055-T14 PC **A22/MF A01**
Pittsburg and Midway Coal Mining Co., Denver, CO.
SRC-II Demonstration Project. Phase Zero, Task Number 7: Deliverable Number 14. Environmental Analysis Status Report.
31 Jul 79, 504p
Contract ET-78-C-01-3055

The Phase Zero portion of the Environmental Analysis consists of subtasks for seasonal and non-seasonal data collection and reporting, EIS (Environmental Impact Statement) liaison, and environmental suitability analysis and reporting. This is the Environmental Analysis Status Report which presents data collected in the first two subtasks; EIS liaison activities are reported in the subtask entitled Environmental Suitability. Studies contained herein were undertaken to perform the baseline work necessary to evaluate the environmental impact of a proposed coal conversion facility using the Solvent Refined Coal (SRC-II) process. The site, located in the Cass District of Monongalia County, West Virginia, was selected for detailed study from among several sites considered during early planning. Data presented encompass three sampling periods which represent about 70 percent of the baseline program. Site specific baseline studies and literature searches began in July 1978. Final field sampling for the planned 12 month program is scheduled for the summer of 1979. Stearns-Roger scientific staff has performed baseline field work with the exception of subcontract work awarded for daily operation of the meteorology and air quality system, infiltration and geotechnical studies, socioeconomic studies, and the archaeology and historical survey. Various laboratory analyses were performed on air, water, sediments, soils, and aquatic organisms using standard and approved laboratory methods. (ERA citation 05:011103)

FE-3199-T2 PC **A03/MF A01**
Florida State Univ., Tallahassee.
Electron Beam Ionization for Coal Fly Ash Precipitators. Annual Report, July 14, 1978-July 13, 1979.
R. H. Davis. Sep 79, 30p
Contract ET-78-S-01-3199

The results of the work have met or exceeded the early expectations. Progress is discussed after an introduction in which the intended role of electron beam ionization of coal fly ash is reviewed. The measurements of ion current density have been eminently successful in that measured values were even larger than expected and no saturation was observed. In a tightly confined good geometry, saturation has been observed but the analysis of the results is not complete at this time. The construction and test of a bench precipitator system, is 3 or 4 months behind schedule because of the delay in recruiting a post-doctoral Research Associate. Several new ideas have come up and a further delay has been caused by the need to build a modular system which will incorporate or test some of the new ideas. (ERA citation 05:013525)

FE-3199-X1 PC **A03/MF A01**
Florida State Univ., Tallahassee.
Electron Beam Ionization for Coal Fly Ash Precipitators. Extended Report No. 1, July 14, 1978-June 13, 1979.
R. H. Davis. Jul 79, 26p
Contract ET-78-S-01-3199

Earlier experiments using electron beam ionization in electrostatic precipitators were extended using a new laboratory scale test system and larger power supplies. An approximately ohmic relationship between ion current and plate voltage suggests the formation of a large grounded plasma region between the electrodes. Large current densities, as high as 500 times that of conventional precipitators, have been observed with no saturation. Variations in ion current densities with beam energy, current, and collimation are due to the intensity of beam ionization in the interelectrode space. Sparkover voltage is probably determined by beam geometry which controls the plasma-to-electrode gap distance and the width of the ionization zone. Measurements with good geometry are required to observe saturation and investigate the interplay between ionization zone restriction and sparkover. Future work will include the use of a medium which simulates fly ash and will address the phenomenon of back corona and its effect on sparkover. (ERA citation 05:012990)

IAEA-197 PC **A03/MF A01**
International Atomic Energy Agency, Vienna (Austria).
Labelled Compounds for Agrochemical Residue Studies in Developing Countries. Report and Recommendations of an Advisory Group Jointly Convened by the IAEA and FAO, Held in Vienna, 2 to 6 August 1976.
1977, 37p CONF-760834-2
Conference of the FAO/IAEA division of Atomic Energy in food and agriculture, Vienna, Austria, 2 Aug 1976.
U.S. Sales Only.

Potential applications of stable and radioactive isotopic tracers for assessing undesirable contaminants in agriculture, fisheries and food are discussed as related to developing countries. Sources and types of residues are considered, and their local implications; also, the availability of suitably labelled compounds, including possible international cooperation to facilitate more centralized and economic preparation, and the distribution of labelled intermediates and compounds for use by local scientists. The provision of training courses and their syllabus are reviewed. Experience in the Joint FAO/IAEA chemical residue and pollution programme has indicated a need for longer-lived radioisotopically labelled pesticides (insecticides, acaricides, fungicides, herbicides, fumigants, etc.) for studying their behaviour. exp 15 N-, exp 13 C- or exp 2 H-labelled fertilizers and fertilizer additives such as nitrification inhibitors will shortly be needed, for studying the behaviour of fertilizer nitrogen residues, and their regulation and conservation, under conditions prevailing in the developing countries. Compounds labelled with stable isotopes are considered particularly valuable under field conditions. The report reviews the present situation and presents specific recommendations to the Directors General of FAO and IAEA. (Atomindex citation 10:463341)

IVL-B-443 PC **A02/MF A01**
Swedish Water and Air Pollution Research Lab., Goteborg.
Factors Influencing pH in Lake Water.
C. Brosset. Jun 78, 10p
U.S. Sales Only.

In lake water containing no humic acid (k/sub a/ = 3.10 exp -4) or humic acid in the concentration 10 exp -4 equiv/l, pH reduction has been calculated as a function of strong acid deposition. It was found that the ability of lake water to withstand a decrease in pH can be drastically reduced by the presence of humic acid. (ERA citation 04:034816)

LA-UR-78-474 PC **A02/MF A01**
Los Alamos Scientific Lab., NM.
Solar Heating and Cooling Working Fluids Released to the Ecosystem.
D. W. Wilson, and F. R. Miera, Jr. 1978, 20p
Contract W-7405-ENG-36

Gylcols, polyglycols, silicone oils, hydrocarbon oils and various corrosion inhibitors and biocides

used in solar heating and cooling systems are tested and evaluated for their potential effects on soils, vegetation, and in regard to potential groundwater contamination. Experimental tests include measurement of the effects of additions of these substances to soils on soil microbial respiration, above ground vegetation, and on the mobilization of chemicals in soil water, including the test substance and any significant biodegradation products. Experimental work aims at developing the data base necessary to evaluate the environmental acceptability of the wide range of materials used for this purpose, addressing the need for development of disposal practices and the means of mitigating effects on the environment due to accidental releases. (ERA citation 05:011435)

LA-UR-79-3298 PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
High Speed Single Particle Sizing by Light Scattering In a Flow System.
G. C. Salzman, R. D. Hiebert, J. H. Jett, and M. Bartholdi. 1980, 6p CONF-800207-1
Contract W-7405-ENG-36
SPIE meeting, North Hollywood, CA, USA, 4 Feb 1980.

Two approaches to rapid, single particle sizing for particles in the 1 to 20 mu m diameter range are presented. One method measures multiangle scattered light over a polar angular range of nearly 360 degrees. A second method is based on the analysis of the pulse shapes from small angle forward scattered light. In both cases the particles in liquid suspension are made to pass one at a time through a focused laser beam for analysis. (ERA citation 05:014162)

LA-8098-MS PC **A07**/MF **A01**
Los Alamos Scientific Lab., NM.
Regional Issue Identification and Assessment (RIIA): An Environmental Evaluation of the EIA Mid-Mid Scenario for Federal Region 8.
Nov 79, 128p
Contract W-7405-ENG-36

This Regional Issue Identification and Assessment (RIIA) study evaluates the environmental impacts associated with future energy development in Federal Region 8 (Montana, North and South Dakota, Wyoming, Utah, and Colorado). The impacts described are for 1985 and 1990 and are based on a national energy scenario that assumes medium energy demand and fuel supply through 1990, but does not incorporate the policies of the National Energy Act (NEA). The scenario, known as the Projection Series C or the Trendlong Mid-Mid Scenario, is one of six possible energy futures that have been produced by the Energy Information Administration of the Department of Energy for the Department's 1977 annual report to Congress. All of these possible energy futures are based on the assumption that electric power is generated in the federal region where it is used. This assumption has the effect of understating actual production levels and environmental impacts for each of the issues in the region. This report's Key Findings and Conclusions sections synopsize the study's results. (ERA citation 05:012496)

LA-8173-MS PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
Assessment of Trace Element Contamination of the Drainages from Coal Cleaning Wastes.
P. Wagner, J. M. Williams, E. M. Wewerka, J. P. Bertino, and L. W. Wangen. Dec 79, 19p
Contract W-7405-ENG-36

The mineral wastes produced by coal cleaning contain in abundance of toxic or potentially harmful trace elements. Although it has been well established that many of these toxic elements are present in the drainages from coal waste dumps, little is known about the quantities released into the environment from this source. The objectives of this research program are to assess the nature and magnitude of the trace elements in the effluents from coal refuse materials, and to develop appropriate environmental control technologies as needed. In this paper we present recent experimental results from this program concerning the chemistry and aqueous leaching behavior of the trace elements in high sulfur coal cleaning wastes. The emphasis is on the interpretation of the experimental data that has led to the identification of trace elements in coal refuse effluents consistently present in unacceptable quantities, and the development of environmental control strategies designed to abate or mitigate the problems of environmental concern that have resulted from these refuse drainages. Experiments have been performed to simulate the intermittent rainfall and weathering to which refuse dumps are subjected. These researchers have revealed that this alternate oxidation and leaching of the pyrite in the refuse is a most effective way to generate acid leachates and indeed these intermittently leached coal waste piles pose a far greater pollution threat, in terms of both quantity and time, than those wastes that are always in contact with water or otherwise isolated from air. (ERA citation 05:011180)

LBL-10280 PC **A04**/MF **A01**
Illinois Univ. at Urbana-Champaign. Dept. of Mechanical and Industrial Engineering.
Combustion Sources of Unregulated Gas Phase Nitrogeneous Species.
R. D. Matthews, and R. F. Sawyer. Dec 79, 68p
Contract W-7405-ENG-48

Published reports which have shown that a wide variety of unregulated nitrogenous species are produced by combustion systems are reviewed and discussed. The total nationwide production is estimated for those species for which sufficient data are available. It is concluded that several noncriteria nitrogen containing species are emitted in significant amounts and that this phenomenon merits further consideration. The emission of gaseous nitrogen compounds from combustion sources is estimated to consist of 76.27% NO, 8.09% NO sub 2 , 15.49% N sub 2 0, 0.10% NH sub 3 and other amines, 0.03% HCN and other nitriles, and 0.02% other nitrogenous species and a mass basis. (ERA citation 05:012426)

N80-20532/1 PC **A03**/MF **A01**
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, OH.
Factors Affecting Cleanup of Exhaust Gases from a Pressurized, Fluidized-Bed Coal Combustor.
R. J. Rollbuhler, and J. A. Kobak. Mar 80, 37p
NASA-TM-81439, E-382

The cleanup of effluent gases from the fluidized-bed combustion of coal is examined. Testing conditions include the type and feed rate of the coal and the sulfur sorbent, the coal-sorbent ratio, the coal-combustion air ratio, the depth of the reactor fluidizing bed, and the technique used to physically remove fly ash from the reactor effluent gases. Tests reveal that the particulate loading matter in the effluent gases is a function not only of the reactor-bed surface gas velocity, but also of the type of coal being burnt and the time the bed is operating. At least 95 percent of the fly ash particules in the effluent gas are removed by using a gas-solids separator under controlled operating conditions. Gaseous pollutants in the effluent (nitrogen and sulfur oxides) are held within the proposed Federal limits by controlling the reactor operating conditions and the type and quantity of sorbent material.

N80-20786/3 PC **A08**/MF **A01**
Industrial Science and Technology Agency, Tokyo (Japan). Electrotechnical Lab.
Microwave Remote Sensing Technology for the Marine Oil Pollution Surveillance.
T. Nenoto, I. Yokoshima, Y. Kato, T. Hidaka, and Y. Kurioka. Aug 79, 166p REPT-202
In Japanese; English Summary.

The existing state of oil pollution in the adjacent seas of the Japanese Archipelago, the techniques used in the oil detection and monitoring, and technical problems to be met in carrying out the patrol mission concerned with the enforcement of marine environment protection law are outlined. Functional requirements of a practical surveillance system useful for facilitating the activities to prevent the marine oil pollution are given. Basic mechanisms of interactions of microwaves at the air-sea water and air-oil-sea water interfaces are described. Reflection coefficients and emissivities of clean sea and polluted sea are exemplified under a number of different conditions of the temperature and salinity of sea water, observing frequency, and polarization of electro-magnetic wave. The mechanisms of interaction between microwave signals and the atmospheric component gases and water droplets of various sizes are described, and examples of parameters useful for calculations of practical atmospheric attenuation and emission of microwaves are given.

N80-20920/8 PC **A02**/MF **A01**
National Aeronautics and Space Administration, Washington, DC.
A Global Biogeocenotical Biosphere Simulation.
N. N. Moiseyev. Mar 80, 12p NASA-TM-76042
Transl. into English from Biogeofiz. I Mate. Metody Issled. Geosistem (Moscow), 1978 p 37-49. Transl. By Kanner (Leo) Associates, Redwood City, Calif.

This model of the D. Forrester type, constructed in differential equations, predicts the food and mineral supply for the factors biosphere population, depending on two socio-economic factors, until about the year 2500. If contemporary rates of natural resources utilization are maintained and there is no management of the environment, food resources will begin to limit human population growth after 2200, and mineral resources will after 2300. A decrease in the biosphere pollution, increase in effective agricultural production, and discovery of new energy sources may forestall or completely avert the onset of a crisis situation. Conservation measures, according to the model, are to a considerable extent realizable only if carried out simultaneously in both areas.

N80-20931/5 PC **A03**/MF **A01**
Water Pollution Research Lab., Stevenage (England).
Studies of Water, 1978-1979.
Annual Report.
1979, 32p

Studies on water and health, wastewater treatment, water oriented economic problems, and environmental protection and monitoring are reported. The health effects of trace constituents in drinking water are discussed. Effluent quality and possibilities for its improvement are mentioned. The use of better methods and improved instrumentation in relation to environmental protection matters is discussed.

N80-21212/9 PC **A05**/MF **A01**
Strasbourg-1 Univ. (France). Bureau d'Economie Theorique et Appliques.
Innovations and Technology Transfer. The Role of the European Space Agency, Volume 1 Innovations et Transferts Technologiques: Le Role de l'Agence Spatiale Europeene.
Final Report.
P. Brendle, P. Cohendet, R. Laruedetournemine, H. Schmied, and D. Vitray. Feb 79, 79p ESA-CR(P)-1219-V-1
Contract ESA-3669/77-F-DKR(SC)
Text in French.

The areas of the economy most receptive to technology transfer, or which are most likely to readily absorb technological innovations were identified. Industrial opinion was solicited concerning the promotion of technical innovations resulting from activities in the European Space Agency (ESA). The sectors where most technology transfer occurs are telecommunications, optics, solar energy, and data processing. The monetary value of the ESA contribution has been determined for various technical sectors. In the view of industry, ESA has a role to play in both fundamental research, and in reducing costs of development. The patent system must be ameliorized within the member states to meet competition in external markets.

ORNL/Sub-77/13509/5 PC **A22**/MF **A01**
EUS, Inc., Pittsburgh, PA.
Survey of Utility Load Management and Energy Conservation Projects. 2ND Revised Report.
Nov 79, 523p
Contract W-7405-ENG-26

In the December 1977 publication of the Survey Part 1, 50 utility-sponsored thermal energy storage (TES) projects and 41 communication and load control (C and LC) projects were summarized. In the April 1978 publication of the Survey Part 2 (EAPA 4:4836), 43 utility-sponsored energy conservation programs were summarized. The 1st Re-

vised Report (EAPA 5:2973), published in December 1978 included descriptions of 21 new TES, 22 new C and LC, and 27 new conservation projects. Also included were those 134 project summaries found in the original Parts 1 and 2 many of which were revised based on responses from a mailing to the utilities concerned. Sections 1 and 2 of this report represent a departure from the format found in the previous Surveys. The projects described in these two sections are grouped into subsections according to the type of TES or C and LC system or device utilized. Each subsection is preceded by a technical discussion of the particular system or device followed, where applicable, by a listing and description of available manufactured equipment. A total of 29 new, 36 revised, and 15 unrevised TES projects and 36 new, 31 revised, and 26 unrevised C and LC projects are described in Sections 1 and 2. All revised projects appear in full summary form as do those new projects that are significant and non-duplicative in terms of scope, equipment used, and/or results. All other projects are included in summary tables found in each respective subsection.Section 3 of this report contains detailed project summaries of 9 new, 42 revised, and 27 unrevised utility-sponsored energy-conservation projects. (ERA citation 05:012046)

ORO-3054-T7 PC **A16**/MF **A01**
Southern Co. Services, Inc., Birmingham, AL.
SRC-I Coal Refinery. Task 7. Environmental Analysis.
31 Jul 79, 353p
Contract ET-78-C-05-3054

Task Seven - Environmental Analysis contains a discussion of all the environmental issues related to the construction and operation of the 6,000 TPD SRC-I Demonstration Plant. The SRC-I process will generate a number of air emissions including sulfur dioxide, particulate, hydrocarbons and reduced sulfur compounds. The major impact on the environment is expected to be caused by sulfur dioxide and hydrocarbon emissions. Sulfur dioxide emissions have been greatly reduced by utilizing the clean fuel gas generated by the SRC-I plant as a fuel source. Hydrocarbon emissions have been greatly reduced by employing control techniques. Wastewater generated in several areas of the SRC-I plant will be collected and treated by a treatment facility located on the plant site. Solid waste generated by the SRC-I process will be handled as follows: inert mineral ash residue will be stored on-site in accordance with best engineering practice; hazardous wastes will be disposed of in a permitted secure landfill located on-site; and non-hazardous waste will be recycled to the process for ultimate degradation. Compliance with applicable environmental regulations influences the design of the plant. To insure that the plant will be in compliance, all directly applicable regulations were combined with the most stringent regulations which could be determined for similar facilities and complied to provide a set of effluent guidelines. Specific compliance techniques are discussed in this volume. An environmental analysis is being carried out to provide the basis for preparation of an Environmental Impact Statement. (ERA citation 05:012973)

PATENT-4 195 519 Not available NTIS
Department of Agriculture, Washington, DC.
Measurement of Water Flow Rate.
Patent,
John A. Replogle, Albert J. Clemmens, and Edward D. Bell. Filed 31 Aug 78, patented 1 Apr 80, 6p PB80-168479, PAT-APPL-938 624
Supersedes PB-288 608.
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

The patent describes a device whereby water flow rate in channelized, flowing bodies of water is measured by first obstructing the flow of water in the body causing a rise in the water surface upstream from the obstruction. This rise in upstream water surface is communicated to a point above the obstruction and measured there at. The measurement is then converted to a water flow rate. A device for measuring water flow rate includes means for producing an obstruction of water flow in the body of water thus causing a rise in the water surface upstream from the obstruction, means for communicating the rise in upstream water surface to a point above the obstruction, and means for measuring the rise at that point, all secured to a frame.

PB80-166077 PC **A11**/MF **A01**
Champion International Corp., Hamilton, OH.
Color Removal from Kraft Mill Effluents by Ultrafiltration.
Final rept. 29 Mar 76-29 Sep 78,
Henry A. Fremont, David J. Striley, Myles H. Kleper, and Robert L. Goldsmith. Feb 80, 247p EPA-600/2-80-045
Contract EPA-S-804312-01
See also report dated Dec 73, PB-231 257. Prepared in cooperation with Abcor, Inc., Wilmington, MA. Walden Div.

Color removal from kraft mill effluents by ultrafiltration (UF) has been examined during this program. A 3-stage, nominal 37.9 cu m (10,000 gpd) UF pilot plant was operated on caustic extraction filtrate for several months. Extensive evaluation of spiral-wound UF modules was carried out prior to staged system operation in single module tests. During these tests feed pretreatment and prefiltration options were investigated and the effects of a range of operating parameters on module flux performance were studied. A second module configuration, tubular assemblies, was also tested. All field tests were performed at the Canton, North Carolina Mill of Champion International. Non-cellulosic UF membranes were evaluated in laboratory tests before field trials were initiated. The preferred membrane was cast from a polysulfone formulation. Spiral modules were severely fouled by species present in white water recycle. Tubular modules, however, exhibited stable, economically-viable flux performance. Color removal by the tubular UF membranes ranged from 97% to 99% when calculated on a concentrate basis. Projections based on process data indicate UF results in an overall color reduction of 91% (mass basis) for caustic extraction filtrate. Conceptual designs and economic analyses were developed for treatment systems with capacities of 3,790 cu m/day (1 MM gpd) and 7,980 cu m/day (2 MM gpd). Additionally, caustic extraction filtrate and decker effluent stream characteristics were monitored and qualitative assessments of ultrafiltrate and UF concentrate recycle within a kraft mill were made.

PB80-166291 PC **E02**/MF **E02**
Building Research Station, Watford (England).
Site Accounting for Waste of Materials.
Current papers,
E. R. Skoyles. c1977, 31p CP-5/78

Studies on building sites have shown that waste of materials has a high incidence and that the first priority for understanding and ameliorating the problem should be the provision of an accounting system to enable builders to identify these losses on site while the work is in progress. A simple method has been devised to enable builders to account for materials used on any site, with any form of contract, and to assess the level of waste of each material during the period it occurs. Little extra work is involved. This paper describes the accounting method and illustrates it with annotated figures.

PB80-166598 PC **A10**/MF **A01**
Environmental Monitoring and Support Lab., Las Vegas, NV.
Assessment of Energy Resource Development Impact on Water Quality: The Tongue and Powder River Basins.
Final rept.,
S. M. Melancon, B. C. Hess, and R. W. Thomas. Dec 79, 216p EPA-600/7-79-249
Prepared in cooperation with Nevada Univ., Las Vegas. Dept. of Biology. See also report dated Nov 79, PB80-153901.

The primary objective of this report is to evaluate the existing water quality monitoring network in the Tongue and Powder River Basins and to recommend needed modifications to the present sampling program. As a basis for these recommendations, known developments, both present and planned, are discussed, and available data examined. The impact of developers on both water quality and quantity is defined. Two areas of particular concern are coal strip mining activities in the vicinity of Sheridan and oil field operations in the Salt Creek watershed.

PB80-166622 PC **A06**/MF **A01**
International Paper Co., Mobile, AL.
Advanced Filtration of Pulp Mill Wastes.
Final rept. 28 Apr 75-27 Feb 78,
John T. McKinnon. Dec 79, 114p EPA-600/2-79-209
Grant EPA-R-803667-01-1

Laboratory and pilot plants studies of reverse osmosis (hyperfiltration) and ultrafiltration of pulp mill wastes were performed by International Paper Company and Oak Ridge National Laboratory (subcontractor). Decker filtrates were treated with dynamically formed reverse osmosis membranes consisting of hydrous zirconium (IV) oxide and polyacrylic acid. Bleach plant caustic extraction filtrate (E1) was treated with dynamically formed ultrafiltration membranes consisting of hydrous zirconium (IV) oxide and hydrous silicon (IV) oxide. The units demonstrated that a properly designed system could effectively treat pulp mill wastewaters to reduce pollution loads and provide recyclable permeates. Mechanical difficulties prevented the accumulation of sufficient data for scale-up calculations but the experience obtained will be useful to fuure work involving dynamic membrane systems.

PB80-166713 PC **A08**/MF **A01**
Seattle Dept. of Water, WA. Water Quality Div.
Seattle Tolt Water Supply Mixed Asbestiform Removal Study. Appendices B and C.
Final rept. May 76-Nov 78,
Gregory J. Kirmeyer. Dec 79, 161p EPA-600/2-79-153
Grant EPA-R-804422
See also PB80-117591 and PB80-122609.

For 1 1/2 years the Seattle Water Department conducted direct filtration pilot plant studies at the Tolt Reservoir, obtaining data on techniques to remove amphibole and chrysotile asbestos from drinking water. Research showed that filtered water turbidity should be 0.1 ntu or lower in order to effectively remove fibers. Flocculation was necessary but sedimentation was not. Amphibole fibers are more readily removed than chrysotile, but both types could be reduced to below detectable limits or to not statistically significant counts by treatment with alum, lime and a filter aid or alum, cationic polymer and a filter aid; or cationic polymer and a filter aid. Asbestos fiber content of filtered water increased sharply when filtered water turbidity rose above 0.10 ntu. Appendix B contains equipment photographs; data on operating conditions, water quality, fiber counting, and filter media; turbid water test data; results of sludge studies; and documentation of cost estimation data. Appendix C has details on conditions for each filter run.

PB80-166739 PC **A99**/MF **A01**
Sacramento Area Consultants, CA.
Sewage Sludge Management Program. Volume 1: SSMP Final Report, Work Plans, and Source Survey.
Final rept.,
Warren R. Uhte, Lyle N. Hoag, Paul Scheidegger, and Allen K. Wolfenden. Sep 79, 834p
See also Volume 2, PB80-166747. Report on Sacramento Regional Wastewater Management Program.
Also available in set of 11 reports PC$240.50, PB80-166721.

Volume 1 of the Sewage Sludge Management Program (SSMP) was prepared for the Sacramento Regional County Sanitation District by Sacramento Area Consultants. The SSMP involved approximately three years of detailed investigative studies and monitoring directed primarily at the engineering, economic, and environmental aspects of storing liquid anaerobically digested sludge in solids storage basins and the disposal of this sludge via dedicated land disposal. Included in this volume is a summary report condensing studies on solids storage, ground water, odor control, land disposal, and microbiology.

PB80-166747 PC **A23**/MF **A01**
Sacramento Area Consultants, CA.

Sewage Sludge Management Program. Volume 2: SSB (Solids Storage Basin) Operation and Performance.
Final rept.,
Warren R. Uhte, Paul A. Scheidegger, and Allen K. Wolfenden. Sep 79, 528p
See also Volume 1, PB80-166739 and Volume 3A, PB80-166754. Report on Sacramento Regional Wastewater Management Program.
Also available in set of 11 reports PC$240.50, PB80-166721.

Volume 2 of the Sacramento Regional County Sanitation District's Sewage Sludge Management Program was prepared by Sacramento Area Consultants and contains a total of five reports. These reports summarize work conducted during the solid storage basin (SSB) studies portion of the sludge management program. Overall objectives were to develop design and operational criteria and to provide assurance that the SSBs could operate in an environmentally acceptable manner. To this end, the operation of existing basins was continually evaluated, detailed field tests of SSB performance were completed, and an intensive monitoring program of SSB parameters was conducted.

PB80-166754 PC **A21**/MF **A01**
Sacramento Area Consultants, CA.
Sewage Sludge Management Program. Volume 3A: Odor Studies, 1975-1977. Diurnal Odor Evaluations at the Solid Storage Basins.
Final rept.,
George E. Wilson, Terry W. Schroepfer, and Jerry Huang. Sep 79, 484p
See also Volume 2. PB80-166747 and Volume 3B, PB80-166762. Report on Sacramento Regional Wastewater Management Program.
Also available in set of 11 reports PC$240.50, PB80-166721.

Volume 3A of the Sacramento Regional County Sanitation District's Sewage Sludge Management Program contains two reports. The first report, 'Diurnal Odor Evaluations at the Solids Storage Basin,' concluded that the occurrence of high solid storage basins (SSB) surface odor emissions was related to thermal stratification, thermal mixing, and coalescence and volatilization of immiscible odorants. The second report, 'SSB Source Odor Control Study,' found that (1) vacuum vaporization is the most effective method of removing odors from liquid anaerobically digested sludge, (2) activated carbon adsorption provides the most effective means of removing the resultant odorants from the vaporization system exhaust, and (3) effective digested sludge odor control reduces SSB surface odor emissions rates by approximately 50 percent.

PB80-166762 PC **A15**/MF **A01**
Sacramento Area Consultants, CA.
Sewage Sludge Management Program. Volume 3B: Odor Studies, 1975-1977. Development of Odor Criteria for Large Emission Areas.
Final rept.,
George E. Wilson, and Terry W. Schroepfer. Sep 79, 350p
See also Volume 3A, PB80-166754 and Volume 4A, PB80-166770. Report on Sacramento Regional Wastewater Management Program.
Also available in set of 11 reports PC$240.50, PB80-166721.

The objective of this study was to develop odor criteria for solids storage basins (SSB) which are now being incorporated into a new 136-mgd regional wastewater treatment plant. The study establishes the relationship between SSB surface odor emission rates and total emission rates for large areas and documents the close relationship between micrometeorological conditions in the vicinity of large emission areas and the dispersion rates which govern the transport of odors from these areas to downwind locations. Frequency distribution curves are developed for SSB downwind dispersion coefficients under strong inversion conditions and SSB surface odor emission rates. These curves are then used to estimate the probable 'at least' and 'at most' frequency of downwind (property line) odor concentrations.

PB80-166770 PC **A99**/MF **A01**
Sacramento Area Consultants, CA.
Sewage Sludge Management Program. Volume 4A: Odor Studies, 1978. Assessment and Control of Large Emission Area Odor Risk.
Final rept.,
George E. Wilson, and Terry W. Schroepfer. Sep 79, 638p
See also Volume 3B, PB80-166762 and Volume 4B, PB80-166788. Report on Sacramento Regional Wastewater Management Program.
Also available in set of 11 reports PC$240.50, PB80-166721.

Volume 4A of Sacramento Regional County Sanitation District's Sewage Sludge Management Program summarizes the 1978 odor studies and documents the final odor risk analysis of the combined operation of the solids storage basins (SSBs) and emergency storage basins (ESBs), important components of the District's new 136-mgd regional wastewater treatment plant. Results of the final odor risk analysis show that from an individual homeowners perspective, the worst risk of exceeding the District's ambient odor criteria of less than 2 odor units per cubic foot (ou/cu ft), using necessary mitigation measures, is less than once per year. Furthermore, the worst risk of threshold odor complaint conditions of 5 ou/cu ft is less than only once every seven years.

PB80-166788 PC **A10**/MF **A01**
Sacramento Area Consultants, CA.
Sewage Sludge Management Program. Volume 4B: Odor Studies, 1978. Preliminary Reassessment of Odor Risk.
Final rept.,
George E. Wilson, and Terry W. Schroepfer. Sep 79, 225p
See also Volume 4A, PB80-166770 and Volume 4C, PB80-166796. Report on Sacramento Regional Wastewater Management Program.
Also available in set of 11 reports PC$240.50, PB80-166721.

One of the objectives of the District's sludge management program was to evaluate the odor risk potential of solids storage basins which are to receive and store anaerobically digested sludge from the District's new 136-mgd regional wastewater treatment plant prior to final land disposal. Volume 4B provides an updated reassessment of odor risk from that which was provided in a 1977 large area emissions study.

PB80-166796 PC **A25**/MF **A01**
Sacramento Area Consultants, CA.
Sewage Sludge Management Program. Volume 4C: Odor Studies, 1978. Development of Design Criteria for Wind Machines and Barriers.
Final rept.,
George E. Wilson, and Terry W. Schroepfer. Sep 79, 596p
See also Volume 4B, PB80-166788 and Volume 5, PB80-166804. Report on Sacramento Regional Wastewater Management Program.
Also available as set of 11 reports, PC$240.50, PB80-166721.

The basic objective of this work was to develop specific design criteria for the application of wind machines and barriers for initial dispersion of odors from solids storage basins (SSBs). Volume 4C contains a complete discussion of 1976 field measurements, and substantial new information from an extensive literature review and from flow visualization studies. The Colorado State University meteorological wind tunnel was used in these studies for simulating dispersion patterns from barriers under stratified flow conditions.

PB80-166804 PC **A21**/MF **A01**
Sacramento Area Consultants, CA.
Sewage Sludge Management Program. Volume 5: Dedicated Land Disposal Study.
Final rept.,
Dwight C. Baier, and Allen K. Wolfenden. Sep 79, 500p
See also Volume 4C, PB80-166796 and Volume 6, PB-166812. Report on Sacramento Regional Wastewater Management Program.
Also available in set of 11 reports PC$240.50, PB80-166721.

The three-year study evaluated alternate methods of sludge spreading and soil incorporation from an engineering, economical, and environmental basis. Precise design and operational criteria for the recommended system, subsurface injection, were developed. The study showed that subsurface injection of sludge is a practical method and will cost the District $34.92 per dry ton and will be relatively free of such nuisances as odors, vectors, indecent sights, and dust. Soil chemistry data revealed that nitrates had percolated to a depth greater than 10 feet in at least one location in the disposal site. A deeper geologic hardpan layer, however, is believed to isolate the groundwater from the percolating pollutants; therefore, sludge spreading has not had a significant effect on the groundwater.

PB80-166812 PC **A13**/MF **A01**
Sacramento Area Consultants, CA.
Sewage Sludge Management Program. Volume 6: Microbiological and Virus Studies.
Final rept.,
David R. Storm, Walter E. Sadler, and Debra K. Strathman. Sep 79, 289p
See also Volume 5, PB80-166804 and Volume 7A, PB80-166820. Report on Sacramento Regional Wastewater Management Program.
Also available in set of 11 reports PC$240.50, PB80-166721.

This volume contains three reports which produced considerable information of the effectiveness of the District's Central treatment plant solids processing system in reducing the populations of various types of microbiological organisms. It was documented that the sludge treatment process resulted in an approximate three-log decrease (99.923 percent) in Fecal streptococci and approximately a seven-log decrease (99.999 percent) in Fecal coliform populations from the raw sludge to the sludge treated soil stage. During the virus study, considerable progress was attained in improving the procedural reproducibility of laboratory techniques used in the viral detection process. During the initial phases, Hepatitis - B antigen (HBsAg) was used as the index virus. Subsequently, the more conventional method of enteric virus detection was employed because of regulatory agency doubt as to the usefulness of using HBsAg as a means of monitoring viruses.

PB80-166820 PC **A20**/MF **A01**
Sacramento Area Consultants, CA.
Sewage Sludge Management Program. Volume 7A: Draft Environmental Impact Report.
Final rept.,
Lyle N. Hoag, Warren R. Uhte, Perry Schafer, and John MacDiarmid. Sep 79, 456p
See also Volume 6, PB80-166812 and Volume 7B, PB80-166838.
Also available in set of 11 reports PC$240.50, PB80-166721.

The report compared and contrasted the environmental, social, economic, and engineering considerations of several post-digestion alternatives to determine the most cost-effective and acceptable solution which could be undertaken. This project provides an energy-efficient, low cost innovative system which takes advantage of the high evaporative characteristics in Sacramento during the summer, and is highly compatible with any reuse option which may develop in the future.

PB80-166838 PC **A11**/MF **A01**
Sacramento Area Consultants, CA.
Sewage Sludge Management Program. Volume 7B: Supplemental Environmental Impact Report and Site Planning.
Final rept.,
Lyle N. Hoag, Warren R. Uhte, Perry Schaefer, and Allen Wolfenden. Sep 79, 232p
See also Volume 7A, PB80-166820. Report on Sacramento Regional Wastewater Management Program.
Also available in set of 11 reports PC$240.50, PB80-166721.

Included in this volume is the supplemental Environmental Impact Report (EIR) which, together with draft EIR (Volume 7A) constitutes the final EIR. The supplemental EIR proposed that the recommended project, consisting of long-term storage of liquid digested sludge with disposal on land at the Regional plant site, be implemented. Additional measures were included in the supplemental

report for the recommended project to mitigate adverse impacts on seasonal wetlands and on agricultural land removed from production. This volume also includes the advanced site planning study which was to develop specific site layout and design criteria for the solids project facilities. Also included in the report is a discussion on project implementation.

PB80-166853 PC **A06**/MF **A01**
Radian Corp., Durham, NC.
Survey of Dry SO2 Control Systems.
Final rept. Apr 79-Jan 80,
G. M. Blythe, J. C. Dickerman, and M. E Kelly.
Feb 80, 122p EPA-600/7-80-030
Contract EPA-68-02-2608

The report gives results of an assessment of the status of dry flue gas desulfurization (FGD) processes in the U.S. for both industrial and utility applications. The assessment is based on reviews of past and current research, development, and commercial activities. Systems covered include: (1) spray dryers with either baghouse or electrostatic (ESP) particulate collectors, (2) dry injection of alkaline material followed by baghouse or ESP collection of wastes, and (3) other systems, such as coal-alkaline material feeds to a combustor and passage of flue gas through a fixed bed of alkaline material. A summary of dry FGD processes, including key features of three types of dry systems and commercial systems, is provided. Limited economic data are also presented. Conclusions and recommendations are given on the potential role EPA can take to advance the overall environmental acceptability of dry FGD systems as viable SO2 control alternatives.

PB80-167026 PC **A04**/MF **A01**
IIT Research Inst., Chicago, IL.
Microscopical Analysis of Aerosols Collected in St. Louis, Missouri.
Final rept. Jun 75-Oct 77,
Ronald G. Draftz, and Kathryn Severin. Feb 80,
61p EPA-600/3-80-027
Grant EPA-R-803078

A study of the concentration of total suspended particulates (TSP) was conducted at two sampling sites in St. Louis, Missouri during July 1975. One site located at the southeastern boundary of the city was adjacent to an industrial area. The other sampling site was located in the commercial downtown area of St. Louis. Selected filters were analyzed microscopically to determine the types and sources of particles contributing to the TSP. The principal cause of high TSP concentrations, except for one sample from the industrial site, was the mineral calcite, which accounted for approximately 50% to 80% of the total TSP at both sites. The highest TSP concentration--214.4 microgram/cu m recorded at the site near the industrial area--was the only sample that showed significant contributions from industrial sources. Approximately 60-75% of the TSP was due to coal and coke particles, probably produced for, or used in, metallurgical reduction. Another 5-15% of the TSP was composed of titanium dioxide and hydrated iron oxides, probably from pigment production.

PB80-167059 PC **A05**/MF **A01**
Vought Corp., Dallas, TX.
Passenger Safety and Convenience Services in Automated Guideway Transit. Volume I. Data Collection, Scenarios, and Evaluation.
Final rept. Jul 77-May 79,
Robert L. Dauber. Dec 79, 83p DOT-TSC-UMTA-79-48-I, UMTA-MA-06-0048-79-4
Contract DOT-TSC-1314-1
See also Volume 2, PB80-167067.

The major objective was to produce a guidebook detailing the most effective methods and procedures for the accommodation of Systems Safety and Passenger Security. The primary intent of this document is to provide guidance associated with abnormal occurrences that have an impact on routine passenger services or safety. The report discusses literature and personal interview findings documenting methods and procedures for detecting and resolving Passenger Safety and Convenience Service (PS&CS) problems in current transit operations; scenarios depicting potential PS&CS problems applicable to the AGT systems; selection of methods and procedures from current practices for detecting and resolving PS&CS problems in AGT; analysis and evaluation of the effectiveness of selected candidate methods and procedures; and recommended methods and procedures for accommodating PS&CS problems in AGT.

PB80-167067 PC **A07**/MF **A01**
Vought Corp., Dallas, TX.
Passenger Safety and Convenience Services in Automated Guideway Transit. Volume II. Guidebook.
Final rept. Apr 78-May 79,
Robert L. Dauber. Dec 79, 133p DOT-TSC-UMTA-79-48-II, UMTA-MA-06-0048-79-5
Contract DOT-TSC-1314-2
See also Volume 1, PB80-167059.

Current practices have been reviewed, analyzed, and evaluated for their effectiveness in accommodating Passenger Safety and Convenience Services (PS&CS) problems in AGT. These practices for providing PS&CS in both conventional and AGT have been assessed as applicable to highly automated transit systems. These guidelines have been developed suggesting methods and procedures to provide these services for AGT systems. The final objective of this guidebook is to provide the most effective methods and procedures for ensuring passenger safety and convenience services in AGT systems. Its contents provide guidance for AGT system planners, designers, operators, and evaluators in identifying potential problems and assessing proposed methods and procedures.

PB80-167075 PC **A05**/MF **A01**
Cottrell Environmental Sciences, Somerville, NJ.
Environmental Protection Agency (EPA) Evaluation of Water Plant Lime Sludge in an Industrial Boiler FGD (Flue Gas Desulfurization) System at Rickenbacker AFB.
Final rept. Sep 78-Feb 79,
Robert J. Ferb. Nov 79, 81p EPA-600/7-79-247

The report gives results of a September 1978-February 1979 test program to evaluate lime water softening waste sludge as an alternate reagent for a flue gas desulfurization (FGD) system on an industrial boiler at Rickenbacker Air Force Base, Ohio. The study also included assessing the availability of the material, designing a system to handle and feed the material, and comparing the economics with conventional lime and limestone reagents. The tests showed that such material worked very well as a reagent and was comparable to lime performance during earlier tests. At SO2 removal efficiencies of up to 80%, utilization exceeded 95%. The study showed that as much as 4-5 million tons/year of the material may be available, much of it in the Midwest U.S. where large deposits of high sulfur coal and a heavy population of industrial plants are located. Estimates indicated that use of water softening sludge in a typical industrial FGD system results in substantially lower annual operating costs compared with either lime or limestone.

PB80-167265 PC **A04**/MF **A01**
JRB Associates, Inc., McLean, VA.
Materials Balance for 2,4-Diaminotoluene. Level I - Preliminary.
Final rept.,
Pauline Johnston, Ron Burger, Virginia Hodge, Karen Walker, and Karen Slimak. 22 Feb 80, 74p
2-800-03-379-24, EPA-560/13-79-016
Contract EPA-68-01-5793

The purpose of the Level I materials balance for 2,4-Diaminotoluene is to evaluate the sources of release of 2,4-DAT to the environment. 2,4-Diaminotoluene is produced commercially for use in the manufacture of 2,4-toluene diisocyanate and dyes. 2,4-Toluene diisocyanate (2,4-TDI) production is estimated to account for 99% of 2,4-DAT use. 2,4-Toluene diisocyanate is commercially manufactured for use in the production of urethane products, mainly polyurethane foams. 2,4-Diaminotoluene is produced directly through its manufacture and indirectly through the hydrolysis of 2,4-TDI and polyurethane foams, the metabolism of 2,4-dinitrotoluene, and the degradation of dyes. Small quantities of 2,4-DAT are imported into the U.S. directly and as a contaminant in 2,4-DAT-containing dyes. The major sources of release of 2,4-DAT to the environment are 2,4-DAT manufacture and 2,4-TDI hydrolysis. Minor sources of release are TDI production, the use of polyurethane foams, dye production and use, the import of 2,4-DAT and the export of TDI. Releases of 2,4-DAT appear to be greatest in areas of West Virginia and Louisiana. Of the 196,000 kkg of 2,4-DAT estimated to have been produced in 1977, greater than 10,600 kkg (5.4%) is estimated to have been released to the environment during that year.

PB80-167372 PC **A02**/MF **A01**
Kentucky Bureau of Highways, Lexington. Div. of Research.
Evaluation of the FHWA Highway Traffic Noise Prediction Procedure (SNAP 1).
Research rept.,
Kenneth R. Agent. Jan 80, 23p RR-534
Sponsored in part by Federal Highway Administration, Washington, DC.

Traffic noise prediction procedures are used in the design of new highways to determine if noise is limited to specific levels. A previous study evaluated the procedure outlined in NCHRP Report 117 and developed a correction factor which was incorporated into Kentucky's noise prediction procedure. This adjusted NCHRP 117 procedure has been used in Kentucky for the past several years. The Federal Highway Administration has developed a new procedure to predict traffic noise levels. The objective of this study was to evaluate the new prediction procedure, designated as SNAP 1. Comparisons of measured and predicted noise levels showed that predictions obtained from SNAP 1 yield better results than from the adjusted NCHRP 117 procedure. Therefore, it is recommended that the SNAP 1 prediction procedure be adopted. There is no need for a general correction factor; however, adjustments to specific portions of the procedure may be necessary to optimize the predictions.

PB80-167380 PC **A06**/MF **A01**
Kentucky Bureau of Highways, Lexington. Div. of Research.
Interstate Safety Improvement Program.
Research rept.
Mar 79, 125p RR-517

The purpose of this report was to prepare prioritized rankings of recommended improvements which could be implemented for the Interstate Safety Improvement Program. Considerable detail is presented which documents analysis procedures used to determine sites, sections, and elements of the roadway in need of improvement. The average number of accidents per interchange, bridge, 1.0-mile (1.6-km) section, and 0.3-mile (0.48-km) spots were summarized for large urban, medium urban, and rural sections of the interstate system. At specified levels of statistical significance, critical numbers of accidents and critical accident rates were calculated to assist in identifying high-accident locations. A limited field inventory of the interstate system was conducted and the results are incorporated into the program. Dynamic programming was utilized as the means of developing prioritized rankings for safety improvements totaling approximately $27,500,000. Example budgets ranging from $5,000,000 to $30,000,000 are also presented.

PB80-167489 PC **A10**/MF **A01**
Browne (Floyd) Associates Ltd., Marion, OH.
Maysville-Mason County Port Authority Riverport Study, Phase One Feasibility, Maysville, Kentucky.
Aug 79, 218p EDA-80-060
Grant EDA-04-06-01771
Sponsored in part by Maysville-Mason County Port Authority.

The report provides the Maysville-Mason County Port Authority with data and analyses of the feasibility for developing a public general cargo riverport. The study has been divided into two phases or reports. Phase One contains natural and manmade characteristics of the port site, the existing regional transportation systems, demographic and economic profiles of the market area and an analysis for the riverport. Phase TWO contains a development plan for the proposed riverport, recommended methods of operation and financing, a phased construction schedule and preliminary cost estimates.

PB80-168065 PC **A09**/MF **A01**
Technology Service Corp., Santa Monica, CA.
Approaches to Analyzing Data from the Portland Study, Task 4.
Final rept.,
Larry S. L. Lai, and John D. Gins. May 79, 181p TSC-PD-A158-5
Contract EPA-68-03-2392

The EPA is currently conducting the Short Test Correlation and Effectiveness Study (Portland Study), a large-scale emission testing program, in Portland, Oregon. For all the vehicles involved in the study, vehicle emissions are measured by three short tests (STs) at a state inspection station and by the three tests plus the Federal Emission Certification Test Procedure (FTP) at an emission testing laboratory. The two basic areas of interest in the Portland Study are: (1) the issue of association of short-test emissions (as measured in areal-world inspection/maintenance environment) and FTP emissions; and (2) theoretical and practical questions concerning the process of inspection and maintenance. The purpose of this report is to provide various sound statistical procedures that could be used in analyzing data from the Portland Study.

PB80-168156 CP **T06**
Environmental Sciences Research Lab., Research Triangle Park, NC. Meteorology and Assessment Div.
MPTER (Multiple Point Algorithm with Terrain Adjustment).
Model-Simulation,
Thomas E. Pierce, D. Bruce Turner, and Adrian D. Busse. 17 Mar 80, mag tape EPA/DF-80/004
Source tape is in ASCII character set. Character set restricts preparation to 9 track, one-half inch tape only. Identify recording mode by specifying density only. Call NTIS Computer Products, if you have questions.

Tape MPTER contains (1) an air quality simulation model, MPTER, and seven example runstreams for the model; (2) two postprocessor programs useful for determining highest and second highest concentrations for air quality simulation model output: TPHI5 for end-to-end averages and TPRN25 for running averages; (3) formatted meteorological data useful for CRSTER, RAMF, and MPTER example runs; (4) a program (UNFORMET) to convert the above meteorological data into unformatted form for entry to the stated models; and (5) a program PTPLU, an improvement of PTMAX, which determines maximum concentrations and distance to maximum concentration for a variety of wind speed and stability conditions. Calculations are made both for wind speed constant with height and wind speed increasing with height. MPTER is useful for estimating relatively non-reactive pollutant concentrations hour-by-hour using the Gaussian steady-state model. The model is most applicable for source-receptor distances less than 10 km in level or gently rolling terrain. Available options include terrain adjustment, gradual plume rise, stack downwash, and buoyancy-induced dispersion.

PB80-168453 PC **E03**/MF **E03**
International Inst. for Applied Systems Analysis, Laxenburg (Austria).
Real-Time Forecasting of Air Pollution Episodes in the Venetian Region. Part I: The Advection - Diffusion Model. Part II: The Kalman Predictor.
Final rept.
E. Runca, P. Melli, A. Spirito, G. Fronza, and A. Tonielli. cDec 79, 52p RR-79-11

The overall object of this research is to set up a scheme for predicting ground-level pollutant considerations for real time control purposes. The forecasting scheme is described, together with its application to sulfur dioxide pollution in the Venetian lagoon area. The scheme is based on a mathematical model to be run on a computer and receiving at the beginning of each interval of time all the information required for the prediction. The type of control action which should be taken on the basis of such a forecast is the object of this part of the research.

PB80-168560 PC **A04**/MF **A01**
Community Services Administration, Washington, DC. Office of Community Action.
Improving Rural Transportation: The Section 18 Program of the Surface Transportation Assistance Act of 1978.
Final rept.
Dec 79, 60p DOT/I-80-11

The report describes the role community action agencies (CAA's) can play in improving rural public transportation services, with specific emphasis on the Section 18 rural transportation grant program. The report discusses application procedure, labor protection requirements, matching requirements, provisions for the elderly and handicapped and implementation strategies. Appendices include a description of the White House rural transportation initiative, the standard labor protection warranty, a list of state contacts, and the emergency regulations for the Section 18 program.

PB80-168594 PC **A13**/MF **A01**
Tippetts-Abbett-McCarthy-Stratton, New York.
Mid-America Ports Study: Alabama. Volume 3 - Appendix.
Final rept.
Jun 79, 290p MA-PORT-970-79077
Contract MA-7-38006
Prepared in cooperation with Temple, Barker and Sloane, Inc., Lexington, MA., Chase Econometric Associates, Inc., New York., and Institute for Public Administration, New York. Errata sheet inserted.

The document presents a major study of ports and cargo facilities on the Mississippi River, its tributaries, the Tennessee - Tombigbee and Gulf intercoastal waterways. This volume contains Appendices data to Volume 1, Main Report, for the State of Alabama.

PB80-168602 PC **A15**/MF **A01**
Tippetts-Abbett-McCarthy-Stratton, New York.
Mid-America Ports Study: Kentucky. Volume 8 - Appendix.
Final rept.
Jun 79, 333p MA-PORT-970-79082
Contract MA-7-38006
Prepared in cooperation with Temple, Barker and Sloane, Inc., Lexington, MA., Chase Econometric Associates, Inc., New York., and Institute for Public Administration, New York. Errata sheet inserted.

The document presents a major study of ports and cargo facilities on the Mississippi River, its tributaries, the Tennessee-Tombigbee and Gulf intercoastal waterways. This volume contains Appendices data to Volume 1, Main Report, for the State of Kentucky.

PB80-168610 MF **A01**
Tippetts-Abbett-McCarthy-Stratton, New York.
Mid-America Ports Study: Mississippi. Volume 11 - Appendix.
Final rept.
Jun 79, 239p MA-PORT-970-79085
Contract MA-7-38006
Prepared in cooperation with Temple, Brker and Sloane, Inc., Lexington, MA., Chase Econometric Associates, Inc., New York., and Institute for Public Administration, New York. Errata sheet inserted.
Available microfiche only because of poor quality.

The document presents a major study of ports and cargo facilities on the Mississippi River, its tributaries, the Tennessee-Tombigbee and Gulf intercoastal waterways. This volume contains Appendices data to Volume 1, Main Report, for the State of Mississippi.

PB80-168628 PC **A13**/MF **A01**
Tippetts-Abbett-McCarthy-Stratton, New York.
Mid-America Ports Study: Missouri. Volume 12 - Appendix.
Final rept.
Jun 79, 300p MA-PORT-970-79086
Contract MA-7-38006
Prepared in cooperation with Temple, Barker and Sloane, Inc., Lexington, MA., Chase Econometric Associates, Inc., New York., and Institute for Public Administration, New York. Errata sheet inserted.

The document presents a major study of ports and cargo facilities on the Mississippi River, its tributaries, the Tennessee-Tombigbee and Gulf intercoastal waterways. This volume contains Appendices data to Volume 1, Main Report, for the State of Missouri.

PB80-168636 MF **A01**
Tippetts-Abbett-McCarthy-Stratton, New York.
Mid-America Ports Study: Nebraska. Volume 13 - Appendix.
Final rept.
Jun 79, 123p MA-PORT-970-79087
Contract MA-7-38006
Prepared in cooperation with Temple, Barker and Sloane, Inc., Lexington, MA., Chase Econometric Associates, Inc., New York., and Institute for Public Administration, New York. Errata sheet inserted.
Available microfiche only because of poor quality.

The document presents a major study of ports and cargo facilities on the Mississippi River, its tributaries, the Tennessee-Tombigbee and Gulf intercoastal waterways. This volume contains Appendices data to Volume 1, Main Report, for the State of Nebraska.

PB80-168644 MF **A01**
Tippetts-Abbett-McCarthy-Stratton, New York.
Mid-America Ports Study: Ohio. Volume 14 - Appendix.
Final rept.
Jun 79, 193p MA-PORT-970-79088
Contract MA-7-38006
Prepared in cooperation with Temple, Barker and Sloane, Inc., Lexington, MA., Chase Econometric Associates, Inc., New York., and Institute for Public Administration, New York. Errata sheet inserted.
Available microfiche only because of poor quality.

The document presents a major study of ports and cargo facilities on the Mississippi River, its tributaries, the Tennessee-Tombigbee and Gulf intercoastal waterways. This volume contains Appendices data to Volume 1, Main Report, for the State of Ohio.

PB80-168651 MF **A01**
Tippetts-Abbett-McCarthy-Stratton, New York.
Mid-America Ports Study: Oklahoma. Volume 15 - Appendix.
Final rept.
Jun 79, 112p MA-PORT-970-79089
Contract MA-7-38006
Prepared in cooperation with Temple, Barker and Sloane, Inc., Lexington, MA., Chase Econometric Associates, Inc., New York., and Institute for Public Administration, New York. Errata sheet inserted.
Available microfiche only because of poor quality.

The document presents a major study of ports and cargo facilities on the Mississippi River, its tributaries, the Tennessee-Tombigbee and Gulf intercoastal waterways. This volume contains Appendices data to Volume 1, Main Report, for the State of Oklahoma.

PB80-168669 MF **A01**
Tippetts-Abbett-McCarthy-Stratton, New York.
Mid-America Ports Study: Pennsylvania. Volume 16 - Appendix.
Final rept.
Jun 79, 175p MA-PORT-970-79090
Contract MA-7-38006
Prepared in cooperation with Temple, Barker and Sloane, Inc., Lexington, MA., Chase Econometric Associates, Inc., New York., and Institute for Public Administration, New York. Errata sheet inserted.
Available microfiche only because of poor quality.

The document presents a major study of ports and cargo facilities on the Mississippi River, its tributaries, the Tennessee-Tombigbee and Gulf intercoastal waterways. This volume contains Appendices data to Volume 1, Main Report, for the State of Pennsylvania.

PB80-168677 MF **A01**
Tippetts-Abbett-McCarthy-Stratton, New York.
Mid-America Ports Study: Wisconsin. Volume 18 - Appendix.
Final rept.
Jun 79, 118p MA-PORT-970-79092
Contract MA-7-38006
Prepared in cooperation with Temple, Barker and Sloane, Inc., Lexington, MA., Chase Econometric Associates, Inc., New York., and Institute for Public Administration, New York. Errata sheet inserted.
Available microfiche only because of poor quality.

The document presents a major study of ports and cargo facilities on the Mississippi River, its tributar-

ies, the Tennessee-Tombigbee and Gulf intercoastal waterways. This volume contains Appendices data to Volume 1, Main Report, for the State of Wisconsin.

PB80-168685 MF **A01**
Tippetts-Abbett-McCarthy-Stratton, New York.
Mid-America Ports Study: West Virginia. Volume 19 -Appendix.
Final rept.
Jun 79, 217p MA-PORT-970-79083
Contract MA-7-38006
Prepared in cooperation with Temple, Barker and Sloane, Inc., Lexington, MA., Chase Econometric Associates, Inc., New York., and Institute of Public Administration, New York. Errata sheet inserted.
Available microfiche only because of poor quality.

The document presents a major study of ports and cargo facilities on the Mississippi River, its tributaries, the Tennessee-Tombigbee and Gulf intercoastal waterways. This volume contains Appendices data to Volume 1, Main Report, for the State of West Virginia.

PB80-168834 PC **A04**/MF **A01**
Kentucky Governor's Economic Development Commission, Frankfort.
Focus on Economic Development in Urban Kentucky.
Final rept.
1980, 67p EDA/ERD-80-144
Grant EDA-OER-667-G-79-11
Proceedings of Conference, Held at Louisville, KY. on Jan 22-24, 1979. Sponsored in part by Kentucky Development Cabinet.

The Conference brought together three hundred community and business leaders and local officials from throughout Kentucky to study the issues related to urban growth and development and to recommend solutions to the problems facing Kentucky cities. The areas covered in four seminars were 'Human Resource Development in Urban Kentucky,' 'Growth Management and Urban Ecology,' 'State and Urban Fiscal Problems and Policy,' and 'Government Structures and Coordination Toward a Coherent State Urban Policy.'

PB80-168867 PC **A12**/MF **A01**
North Dakota State Dept. of Health, Bismark. Div. of Environmental Research.
The Long-Term Effects of Trace Elements Emitted by Energy Conversion of Lignite Coal. Volume I.
Final rept.,
Martin R. Schock, William W. Morrison, and Gene A. Christianson. Jul 79, 274p
Contract OWRC-10773210
See also Volume 2, PB80-168875.

A two-year project, concerning effects of selected elements upon the ecosystem surrounding a 675-megawatt coal-fired electrical generating facility, was completed. This project involved the collection of coal, stack fly ash, aerosol, surface water, snow, sediments, soil, and vegetation samples for analysis of element concentrations. A modified atmospheric transport and deposition computer model was developed and used to predict ground-level air concentrations and development of elements from the burning of lignite coal. The results of the project provide evidence of enrichment of certain elements in aerosols, snow, water, soil surface, and vegetation.

PB80-168941 PC **A14**/MF **A01**
Case Western Reserve Univ., Cleveland, OH. Dept. of Systems Engineering.
Coordination of Overlapping Hierarchical Water Resources Systems.
Doctoral thesis,
Kai Sung. 10 Jan 78, 321p W80-04292, OWRT-C-7047(6221)(3)

A multiobjective total system model approach to water resources planning was developed by combining three approaches to planning: The Surrogate Worth Tradeoff (SWT) method, the TECHCOM approach, and the Utility Analysis approach. The SWT method, a quantitative approach, optimizes a mathematical analytical model by mathematical programming and interacts with decision makers. TECHCOM, a scenario approach, displays and analyzes information to reach the best solution for a large-scale complex system. Utility Analysis, a qualitative approach, interacts directly with decision makers to find preferences for different objectives. Using this optimization structure many submodels are developed such as agricultural models, recreational development models, wildlife preservation models, and flooding control models. These models are used in an application of the SWT method to the Maumee River Basin Level-B Study.

PB80-168966 PC **A07**/MF **A01**
Case Western Reserve Univ., Cleveland, OH. School of Engineering.
A Hierarchical Multiobjective Method for Water Resources Planning.
Master's thesis,
Stephen Charles Olenik. 31 May 78, 138p W80-04293, OWRT-C-7047(6221)(5)
Contract DI-14-34-0001-6221

Hierarchical multiobjective optimization was used in two approaches for the possible combination of the TECHCOM methodology and the Surrogate Worth Trade-Off (SWT) methodology for use by decision-makers in water resources planning. TECHCOM has a hierarchical structure (goals, subgoals, social indicators, and action variables) that preserves information at all levels so that alternatives can be analyzed without the loss of lower level information. The SWT method, which solves the standard vector optimization problem were objectives are non-commensurable, can find a preferred solution by finding Pareto-optimal solutions and tradeoffs and using systematic decision-maker input. Two sample integrations of TECHCOM and SWT were tested on a sample problem using the Maumee River Basin Level-B land resources model.

PB80-169170 PC **A11**/MF **A01**
Texas Water Development Board, Austin.
Continuing Water Resources Planning and Development for Texas. Volume 1.
Draft rept.
May 77, 246p
See also Volume 2, PB80-169188.

In Volume 1 of this Phase 1 update and revision of the Texas Water Plan, water supply and related problems have been identified; State and Federal statutes and institutions which govern or impact water-resources development and use have been briefly described; planning methodology and planning data have been described; and the importance of water for the economic, environmental, and social well-being of Texas has been presented.

PB80-169188 PC **A99**/MF **A01**
Texas Water Development Board, Austin.
Continuing Water Resources Planning and Development for Texas. Volume 2.
Draft rept.
May 77, 825p
See also Volume 1, PB80-169170.

Volume II presents analyses of current water use, projections of water requirements and water-related needs to meet the State's foreseeable 50-year future needs, and projections of available ground- and surface-water supplies and use of these sources of supply to meet projected needs in each river and coastal basin of Texas, including planning subareas as shown in the following illustration. Water-resource development needs and alternatives are assessed with respect to time of need, quantity of water supply, flood-protection elements, and estimated costs-with emphasis on immediate problems and needs and projected needs to the year 2000.

PB80-169246 PC **A04**/MF **A01**
TRW, Inc., Redondo Beach, CA.
Surface Containment for Geothermal Brines.
Final rept.,
R. Sung, W. Murphy, J. Reitzel, L. Leventhal, and W. Goodwin. Feb 80, 55p EPA-600/7-80-024
Contract EPA-68-03-2560

This report examines the probability of significant releases of geothermal brine to the surface environment through unplanned or accidental events. It then evaluates the containment measures that may be used to prevent environmental damage. The results indicate that major spills are likely to be very rare and that simple warning systems and diked containment areas should provide adequate protection.

PB80-169279 PC **A05**/MF **A01**
California State Dept. of Transportation, Sacramento. Office of Traffic Engineering.
Conventional Road Safety. Phase 1. (A Study of Fixed Objects).
Final rept.,
E. A. Rinde. Aug 79, 97p 623153, FHWA/CA-79-1

The report describes the search for cost-effective ways of reducing fixed object accidents on conventional state highways in California. Four of the fourteen fixed objects shown in the TASAS computer file were selected for in-depth study. Accident data and the number of objects for - ends of bridge railing, utility poles, traffic sign posts and trees - were collected. A 15-mile route segment was studied in detail. It was found to be cost-effective to treat 5 fixed objects on the route by replacing bridge rail, moving utility poles, removing trees, protecting ends of bridge railing with guardrail and making traffic signs breakaway.

PB80-169337 PC **A13**/MF **A01**
Multisystems, Inc., Cambridge, MA.
The Knoxville Tennessee Transportation Brokerage Demonstration: An Evaluation.
Final rept. Oct 75-Jun 78,
R. D. Juster, J. A. Kruger, and C. F. Ruprecht. Aug 79, 300p UMTA-TN-06-0006-80-1
Contract DOT-TSC-1083

The Knoxville Tennessee Transportation Brokerage Demonstration was conducted from October 1975 through December 1978. In this first metropolitan, multi-modal implementation of the brokerage concept, an organization known as the Knoxville Commuter Pool (KCP) attempted to identify and match transportation demand and supply across a variety of users and providers, and to effect legal and regulatory reforms conducive to the improvement of transportation services. Primary emphasis during the demonstration was on serving the commuters and social service agencies. A major aspect of KCPs commuter-oriented activities was the large scale surveying of employees at their worksites and their subsequent computer matching with buses and with other commuters having similar travel patterns. KCP purchased 51 vans and leased them to individual commuters as part of an operational vanpool program designed to encourage the growth of a large private vanpool fleet. Implementation of the vanpool program and its resulting impact on state regulatory law and vanpool insurance is discussed, as well as the resulting changes in Tennessee laws affecting other public transportation modes as well.

PB80-169386 PC **A10**/MF **A01**
Environmental Research and Technology, Inc., Concord, MA.
Case Study Analysis of Supplementary Control System Reliability.
Final technical rept.,
B. Egan, G. Hoffnagle, J. Lague, R. McCann, and S. Doucette. Aug 78, 209p EPA-450/3-78-039
Contract EPA-68-02-2090
See also report dated Mar 76, PB-260 648.

Through a supplementary control system (SCS), SO2 emissions from a facility are temporarily curtailed when meteorological conditions conducive to high ambient SO2 concentrations exist or are anticipated. This report describes a case study demonstration of SCS reliability analysis techniques presented in 'Technique for Supplementary Control System Reliability Analysis and Upgrading' (EPA-450/2-76 015). A user manual is also provided. A primary objective of this study is to discuss the reliability analysis techniques and their applicability to the problem of estimating SCS reliability.

PB80-169436 PC **A04**/MF **A01**
Environmental Sciences Research Lab., Research Triangle Park, NC.
Scheme for Estimating Dispersion Parameters as a Function of Release Height.
Rept. for Jul 77-Jun 79,

John S. Irwin. Oct 79, 68p EPA-600/4-79-062

A generalized scheme is presented for estimating atmospheric pollutant dispersion parameters as a function of release height. Further development is needed to refine the scheme for more generalized applicability, since, as documented in this discussion, the scheme requires as input meteorological data not routinely available. The scheme incorporates results from various studies, and once it is more practically structured it will prove useful for characterizing dispersion from tall sources in a variety of situations. The generalized scheme was developed particularly for Gaussian plume modeling; therefore, it is restricted to modeling applications having flat terrain and having steady-state meteorological conditions.

PB80-169477 PC **A07**/MF **A01**
California State Dept. of Transportation, Sacramento. Office of Transportation Lab.
Triaxial Testing of Large Diameter Compacted Soil Specimens.
Final rept.,
R. H. Prysock. Oct 79, 137p TL-632815, FHWA/CA/TL-79/19

The purpose of this study was to develop procedures for testing large diameter compacted soil specimens and to evaluate the feasibility of using the multiple-stage test procedure for large specimens. Results indicate that, except for extremely rocky soils, 6-inch diameter specimens would be adequate and minimize field sampling problems. It was concluded that the multiple-stage test is a viable alternate to the conventional three-specimen test procedure and reduces overall laboratory time to about 40 percent of that for conventional tests. Friction angles obtained from the multiple-stage tests usually agreed within two to three degrees with those from conventional tests.

PB80-169550 PC **A04**/MF **A01**
Radian Corp., Austin, TX.
Investigation of NO2/NOx Ratios in Point Source Plumes.
Final rept. Dec 78-Dec 79,
J. P. Blanks, E. P. Hamilton, III, B. R. Eppright, and N. A. Nielsen. Feb 80, 74p EPA-600/7-80-036
Contract EPA-68-02-2608
See also PB-289 498.

The report gives results of a study to relate ground level NO2 concentrations to NOx emissions (NO2/NOx ratio) in plumes from six large power plants in the Chicago area, using a photostationary state reactive Gaussian plume model. The aim of the study was to assess the level of NOx control required to meet a probable short-term NO2 national ambient air quality standard (NAAQS). The major uncertainty of an earlier study was its assumption of uniform, fixed NO2/NOx ratios of 0.5 (summer) and 0.25 (winter). The previous study indicated that most of the six plants could meet a 500 microgram/cu m short-term NO2 standard using NOx combustion modification techniques (50% NOx control); this study indicates NOx flue gas treatment technology (90% control) may be required on these plants to meet a 750 microgram/cu m standard, and most certainly for 500 micrograms/cu m.

PB80-169600 PC **A05**/MF **A01**
Georgia Inst. of Tech., Atlanta. School of Civil Engineering.
Wrong-Way Traffic Movements on Freeway Ramps.
Final rept. 1977-79,
Peter S. Parsonson, and James R. Marks. 19 Sep 79, 97p FHWA/GA-79/001

Special cameras purchased from the California DOT were used by Georgia Tech to monitor the wrong way traffic movements at 45 representative off-ramps in the Greater Atlanta freeway system. Countermeasures were installed and evaluated at nine of these locations. Recommendations for a statewide program of countermeasures were presented. The report includes an annotated bibliography summarizing wrong-way research performed to date by California, Virginia, Georgia, etc. It was concluded that high rates of wrong-way entries are found in the Atlanta area at incomplete interchanges (where such entries are often intentional); and at loop off-ramps that have their crossroad terminal adjacent to the on-ramp. The main recommendations offered to the Georgia DOT were as follows: State policy should discourage the construction of these two types of design; the California DOT's standard sign package, supplemented by a painted stopbar, should be implemented statewide; and where loop off-ramps have their crossroad terminal adjacent to the on-ramp, an additional countermeasure is recommended: a crossroad median divider consisting of a row of ceramic buttons.

PB80-170111 PC **A03**/MF **A01**
Environmental Protection Agency, Washington, DC. Office of Research and Development.
A Small Oil Spill at West Falmouth.
Decision series.
Mar 79, 33p EPA/600/9-79-007

This is a report about oil and its effects in marine environments, a technically complex subject that is further shrouded by controversy between conflicting interests. This report focuses on an investigation of a modest oil spill which occurred at West Falmouth, Massachusetts in September, 1969.

PB80-170145 PC **A06**/MF **A01**
Midwest Research Inst., Kansas City, MO.
Effectiveness of Alternative Skid Reduction Measures. Volume III. Users Manual.
Final rept. Jun 73-Nov 78,
A. D. St. John, R. R. Blackburn, and D. W. Harwood. Nov 78, 105p 3824-D-VOL-3, FHWA-RD-79-24
Contract DOT-FH-11-8120
See also Volume 1, PB80-158454, and Volume 4, PB80-170152.

A computerized benefit-cost model is presented for use by state highway departments in the selection of accident-reduction countermeasures to be applied to investigated sites. The model has capability to evaluate both surface modifiction countermeasures, which increase frictional supply, and geometric and traffic control countermeasures, which reduce frictional demand. The model considers the effectiveness of each countermeasure under both wet- and dry-pavement conditions. The model logic is described briefly to familiarize the program user with the type of analysis performed. The information needed by state highway department to use the model as a decision-making tool is presented in detail. Such information includes input requirements, input formats, output formats and interpretation of analysis results.

PB80-170152 PC **A07**/MF **A01**
Midwest Research Inst., Kansas City, MO.
Effectiveness of Alternative Skid Reduction Measures. Volume IV. Criteria for Improvement of Pavement Surface Macrotexture.
Final rept. Jun 73-Nov 78,
D. W. Harwood, R. R. Blackburn, and P. J. Heenan. Nov 78, 149p 3824-D-VOL-4, FHWA-RD-79-25
Contract DOT-FH-11-8120
See also Volume 3, PB80-170145.

This volume presents a guide to the role of pavement macrotexture in pavement skid resistance and accidents. An overview of the fundamentals of tire-pavement skid resistance is presented. The methods of measuring macrotexture in the field and in the laboratory are described based on a review of relevant literature. The measurement methods currently employed by state highway departments are identified; the sand patch method is the most widely used and accepted method in the United States for measuring pavement macrotexture. Methods of providing macrotexture in new pavements and restoring macrotexture in existing pavements are described. The methods of providing macrotexture in new pavement include open-graded asphalt surface courses and texturing of portland cement concrete surfaces; the methods of restoring macrotexture to existing surfaces include open-graded asphalt overlays, pavement grooving, cold milling, and seal coats. A cost-effectiveness analysis procedure for alternative methods for improving pavement macrotexture is presented. Such analyses can be used as the basis for cost-effective warrants for pavement macrotexture improvements. The development of cost-effective warrants is illustrated by a numerical example.

PB80-171341 PC **A04**/MF **A01**
Ohio State Univ. Research Foundation, Columbus.
An Evaluation of the Oak Ridge National Laboratory Subregional Land-Use Allocation Model. Volume III.
Final rept. 15 Aug 77-31 Aug 79,
Oscar Fisch, Steven I. Gordon, James Sequin, and Howard Trotman. Aug 79, 73p NSF/RA-790383
Grant NSF-ENV77-15020
See also Volume 2, PB80-164841.

A subregional model is reviewed prior to the applications testing of the model in Ohio. Its purpose is to interface labor supply and demand with industrial level-use allocation. In practice, land use is not considered at all by the model except in implicit terms. Instead, the model allocates labor and population to subregions through the process of adding and removing industrial plants and other activities. The model also calculates the commuting and migration which result from the allocation process. This overview of the theories and ideas behind the model includes the following: (1) a critique of the mathematical representation made of the socioeconomic system by this model; (2) a focus on a series of technical problems in the computer code, documentation, data sources, and availability; and (3) a set of recommendations and conclusions concerning this model and its potential usefulness in Ohio.

PB80-173677 PC **A11**/MF **A01**
Corps of Engineers, Washington, DC.
A Study of the Feasibility of Land Treatment for Wastewater Management in the Sacramento Area. Phase II.
Nov 75, 248p NSF/PRA-7600217/1
Grant NSF-STP76-00217

This study was one part of an interagency technical evaluation of EPA's waste treatment grant program, which was initiated by OMB and involved EPA, CEQ, NSF and the Corps of Engineers. The evaluation, using Sacramento as the case study, determined the effectiveness of the planning process, particularly in regard to cost effectiveness and technical feasibility of alternative treatment techniques, impacts on receiving water quality, and overall environmental effects. The study analyzed the feasibility of the various land treatment alternatives to the regional wastewater treatment plan that was chosen.

PB80-173701 PC **A03**/MF **A01**
National Science Foundation, Washington, DC. Science and Technology Policy Office.
Evaluation of the Planning Process for EPA Wastewater Treatment Facilities Grants. Interpretive Summary. The Sacramento Regional Wastewater Management Program: A Case Study.
Feb 76, 47p NSF-76-500

The National Science Foundation has prepared this Interpretive Summary to identify issues of possible national importance from the Sacramento studies. This Interpretive Summary contains a background section summarizing basic information about water resources and water quality in the Sacramento area and the developments of the Sacramento Regional Wastewater Management Program. This is followed by a discussion of the principle policy and technical issues of national interest that emerged from the Sacramento case study. These were identified during the review of the contractors' case studies and various meetings with local and state representatives.

PB80-173727 PC **A07**/MF **A01**
National Oceanic and Atmospheric Administration, Wasington, DC. Environmental Data and Information Service.
USNS Potomac Oil Spill Melville Bay, Greenland, 5 August 1977. A Joint Report on Scientific Studies and Impact Assessment by the NOAA-USCG Spilled Oil Research Team and the Greenland Fisheries Investigations, Ministry for Greenland,
Peter L. Grose, James S. Mattson, and Hanne Petersen. Aug 79, 139p NOAA-80031106

This report presents the studies and findings of the NOAA-USCG Spilled Oil Research and Greenland Fisheries Investigations, Ministry for Greenland

teams which responded to study the spill. In summary, the fate of the 107,000 gallons of spilled Bunker-C fuel was that 33% evaporated; the major part of the remaining seems to have sunk in 1,000 meters of water over a large area of Melville Bay and a small part remained on the surface as small pancakes. A very small amount of the oil was accommodated into the water column. Melville Bay is not a highly bioproductive area in terms of fisheries, although it is important as a native sealing area. It was concluded that the oil spilled from the USNS Potomac significantly contributed to the pollution of Melville Bay which normally has very low petroleum hydrocarbon levels in its surface waters. This incident probably had no lasting effect on the ecology of the region.

PB80-173875 PC **A04**/MF **A01**
Transportation Research Board, Washington, DC.
Technology Transfer, the Research Process, and Creating a Productive Environment,
W. L. Garrison, Robert C. Crawford, Al B. Linhares, George F. Linsteadt, and Milton P. Criswell. 1979, 58p TRB/TRR-738, ISBN-0-309-02993-7
Library of Congress catalog card no. 80-13980. Also pub. as ISSN-0361-1981.
Paper copy also available from Transportation Research Board, 2101 Constitution Avenue, NW, Washington, DC. 20418.

Contents: Transportation technology supply; Overview of the National Science Foundation's intergovernmental program; Overview of federal programs and activities; Federal laboratories-a national resource; Federal and state programs and activities for transportation technology transfer; Local government technology transfer; Local government technology transfer--a service user's view; Measuring the effectiveness of a research program; Examination of techniques to enhance the utilization of research results; University management of a transportation department's research program; Organizational aspects of a state transportation research unit; Role of management support for research; Development of multidisciplinary research programs; How to get commitment to productivity; Scoping the research problem; and Managing the research project.

PB80-173958 PC **A02**/MF **A01**
Rutgers - The State Univ., New Brunswick, NJ. Water Resources Research Inst.
Phosphate Removal from Industrial and Municipal Wastewater.
Technical completion rept. (Final),
Robert C. Ahlert, Marvin L. Granstrom, and Muhammad A. Slam. Apr 80, 12p W80-04543, OWRT-A-052-NJ(1)
Contract DI-14-34-0001-9032

Phosphorus removal was evaluated at several points in a conventional wastewater treatment process. Samples were taken from a secondary plant utilizing a high rate trickling filter on municipal wastewater. Treatment of settled primary effluent, secondary effluent and settled secondary effluent was considered. The experimental matrix included ferric ion dosage and pH level. Sampling points were selected to highlight process variables of interest. These included organic carbon content and unsettled solids content. In all cases, phosphorus removal was substantially less than predicted from pure species solubility data.

PB80-174055 PC **A99**/MF **A01**
Versar, Inc., Springfield, VA.
Technology Assessment Report for Industrial Boiler Applications: Coal Cleaning and Low Sulfur Coal.
Final rept. Sep 78-Jul 79,
J. Buroff, B. Hylton, S. Keith, J. Strauss, and L. McCandless. Dec 79, 762p EPA-600/7-79-178C
Contract EPA-68-02-2199
See also PB80-152606. Prepared in cooperation with Teknekron, Inc.

The report assesses the use of three pollution control technologies--low sulfur coals, physical coal cleaning (PCC), and chemical coal cleaning (CCC)--to comply with SO2 emission regulations. It is one of a series to be used in determining the technological basis for a new source performance standard for industrial boilers. Candidate systems were selected after consideration of 7 naturally occurring low sulfur coals, 5 levels of sulfur removal by PCC, and desulfurization by 11 CCC processes. The best systems of emission reduction were identified for three coals at each of five emission control levels. For regulatory purposes this assessment must be viewed as preliminary, pending results of a more extensive examination of impacts called for under Section III of the Clean Air Act Amendments.

PB80-174170 PC **A02**
Woods Hole Oceanographic Institution, MA.
An Oil Spill Sampling Strategy,
Woollcott Smith. 1979, 11p NOAA-80031713
Grant NOAA-04-8-M01-149
Pub. in Sampling Biological Populations, p355-363 1979.

A strategy for oil spill surveys is outlined. It depends on over-sampling in the first survey, and recording easy-to-measure variables associated with each sample. In the second stage, the samples are sub-sampled for the more expensive and time-consuming biological and chemical analysis. This procedure is an extension of double sampling. This kind of survey is easy to implement on short notice and, because it is based on classical sampling theory, the survey's results should be relatively easy to defend in administrative and legal proceedings.

PB80-174295 PC **A05**/MF **A01**
Cornell Univ., Ithaca, NY. School of Civil and Environmental Engineering.
Detecting Landfill Leachate Contamination Using Remote Sensors.
Project rept.,
Dwight A. Sangrey, and Warren R. Philipson. Sep 79, 78p EPA-600/4-79-060
Contract EPA-68-03-2438
Color illustrations reproduced in black and white.

A methodology for using remote sensing to detect landfill leachate contamination of ground and surface water is described. Among the topics covered are leachate indicators, spatial and temporal aspects of leachate detection, sensor selection, flight design and data interpretation. Specific methodologies for using remote sensing to detect leachate under various situations are described. These range from survey monitoring of individual landfills to comprehensive programs for regulatory monitoring and landfills.

PB80-174592 PC **A02**/MF **A01**
State Univ. of New York at Stony Brook. Marine Sciences Research Center.
A Conceptual Framework for Assessing Dredging/Disposal Options in Chesapeake Bay.
Special rept.,
J. R. Schubel, H. H. Carter, D. W. Pritchard, P. K. Weyl, and W. M. Wise. Apr 79, 16p SR-25, REF-79-8, NOAA-80031212

Most materials dredged from Chesapeake Bay are composed of natural sediments from upland areas that are carried into the Bay by rivers and streams; smaller contributions come from shore erosion and primary productivity. But pollutants are added to rivers and directly to the estuary by municipal and industrial discharges, and by accidental releases. The primary purpose of this report is to identify research needs specific to dredged material management in Chesapeake Bay.

PB80-174600 PC **A03**/MF **A01**
National Oceanic and Atmospheric Administration, Ann Arbor, MI. Great Lakes Environmental Research Lab.
The Effects of Dredging on the Chemical Characteristics of the Grand River,
Brian J. Eadie, Gerald L. Bell, Richard L. Chambrs, John M. Malczyk, and Edward A. Stankevich. Jan 80, 31p NOAA-ERL-GLERL-14, NOAA-80031802

During spring 1977, water was sampled in the Grand River, which runs through the State of Michigan, to estimate the increased loads of polluting and enriching substances caused by dredging the river channel near its mouth at Lake Michigan. Results indicate that sedimentary material disturbed during the dredging process is carried out to the lake. On an annual basis, the increase in loading is approximately 1% for all variables measured; however, during the period of dredging (about 1 week), the increases are approximately 30%.

PB80-174998 PC **A13**/MF **A01**
Montgomery (James M.), Inc., Walnut Creek, CA.
An Evaluation of the Water Quality Impacts of the EPA's Wastewater Facilities Grants Planning Process: A Case History.
Final rept.,
A. Gene Rheault, Ronald A. Tsugita, and Robert H. Ellis. Nov 75, 281p NSF/STP-7522384/1
Grant NSF-STP75-22384

This is a preliminary review and analysis of project documents and supporting material supplied by NSF and conducted during Phase I of this project. From this review, major study items were identified and a proposal was prepared for further evaluation of the Water Quality impacts of EPA's wastewater facilities grants planning process. As part of Phase I, brief abstracts of each of the documents supplied by the NSF were prepared and are included in this report. Preparation of these abstracts and preliminary analyses of the 'Case History' resulted in the identification of study items for Phase II; Water quality objectives, assimilative capacity of receiving waters, wasteload allocations, facilities planning and regulations and guidelines.

PB80-175003 PC **A08**/MF **A01**
Intrec, Inc., Santa Monica, CA.
An Assessment of Planning for Water-Pollution Control in Sacramento, California.
Final rept.
Dec 75, 155p NSF/STP-7522499/1
Contract NSF-C-1046, Grant NSF-STP75-22499
See also PB80-175011.

This report contains an evaluation of the Sacramento Regional Wastewater Management Plan and its possible effects on nearby waters, an account of intensive survey of the Sacramento River, an analysis of the water-quality standards (WQS) for the lower Sacramento River Basin and the Sacramento-San Joacquin Delta, and an appraisal of the waste-discharge requirements for sewage treatment plants (STPs) in Greater Sacramento. Appendix A contains measurements from the river survey. Appendix B deals with relevant riverflow data and also describes the analytical methods. The conclusions of the study are that fears of fish poisonings, contaminated water supplies, and ugliness with or without the sewage treatment plant are questionable on the basis of the riverflow.

PB80-175011 PC **A15**/MF **A01**
Intrec, Inc., Santa Monica, CA.
An Assessment of Planning for Water-Pollution Control in Sacramento, California. Appendix A. Dissolved Oxygen, Temperature, and Conductivity in the Lower Sacramento River and Adjacent Waters, August 16-September 7, 1975. Appendix B. Data Supplement: Methods and Analysis.
Final rept.
Jan 76, 342p NSF/STP-7522499/2
Contract NSF-C-1046, Grant NSF-STP75-22499
See also PB80-175003.

This report contains an evaluation of the Sacramento Regional Wastewater Management Plan and its possible effects on nearby waters, an account of intensive survey of the Sacramento River, an analysis of the water-quality standards (WQS) for the lower Sacramento River Basin and the Sacramento-San Joacquin Delta, and an appraisal of the waste-discharge requirements for sewage treatment plants (STPs) in Greater Sacramento. Appendix A contains measurements from the river survey. Appendix B deals with relevant riverflow data and also describes the analytical methods. The conclusions of the study are that fears of fish poisonings, contaminated water supplies, and ugliness with or without the sewage treatment plant are questionable on the basis of the riverflow.

PB80-175086 PC **A13**/MF **A01**
Southwest Research Inst., San Antonio, TX.
Disposal of Hazardous Waste. Proceedings of the Annual Research Symposium (6th) Held at Chicago, Illinois on March 17-20, 1980.
Final rept. Oct 79-Sep 80,

David Shultz, and David Black. Mar 80, 300p
EPA-600/9-80-010
Grant EPA-R-807121
See also report dated Mar 80, PB80-175094.

These proceedings are a compilation of the papers presented by symposium speakers. They are divided into two volumes representing the technologies of Treatment and Disposal. The primary technical areas covered are: (1) Waste Sampling and Characteristics; (2) Transport and Fate of Pollutants; (3) Pollutant Control; (4) Waste Treatment and Control; (5) Pesticide Treatment and Control; (6) Co-Disposal; (7) Landfill Alternatives; (8) Remedial Actions; (9) Thermal Destruction Techniques; (10) Economics.

PB80-175094 PC **A09**/MF **A01**
Southwest Research Inst., San Antonio, TX.
Treatment of Hazardous Waste. Proceedings of the Annual Research Symposium (6th) Held at Chicago, Illinois on March 17-20, 1980.
Final rept. Oct 79-Sep 80,
David Shultz, and David Black. Mar 80, 183p
EPA-600/9-80-011
See also report dated Mar 80, PB80-175086.

These proceedings are a compilation of the papers presented by symposium speakers. They are divided into two volumes representing the technologies of Treatment and Disposal. The primary technical areas covered in this volume are: Waste Sampling and Characteristics; Waste Treatment and Control; Pesticide Treatment and Control; Thermal Destruction Techniques; Economics.

PB80-175524 PC **A19**/MF **A01**
American Textile Manufacturers Inst., Washington, DC.
Technical and Economic Evaluation of BATEA Textile Guidelines.
Final rept. Jan 76-Mar 79,
R. E. Mayfield, T. N. Sargent, and E. J. Schroeder. Jan 80, 441p EPA-600/2-80-041
Grant EPA-R-804329
Prepared in cooperation with Engineering Science, Inc.

The report gives results of a project to determine if the Best Available Technology Economically Achievable (BATEA) effluent guidelines promulgated by EPA in 1974 for the textile industry can be achieved by recommended advanced wastewater tertiary treatment technologies. Pilot scale treatment units in two identical trailers were used at 19 textile plants participating in the field evaluation phase of the project. The unit operations were tested on biologically treated effluent from existing facilities at each plant. The most effective treatment was identified for each plant and operated continuously long enough to statistically determine the quality of the treated effluent. In all cases results were compared to BATEA values calculated from the promulgated guidelines and actual production information from the plants during the trailer visits. The comparisons indicated that technical achievement of the BATEA guideline limits for the various criteria pollutants was not consistent in all categories. The cost of installing and operating the selected BATEA tertiary operations in commercial textile plants was determined and guidelines for estimating these costs were established.

PB80-176365 PC **A14**/MF **A01**
GCA Corp., Bedford, MA. GCA Technology Div.
Technology Assessment Report for Industrial Boiler Applications: Particulate Collection.
Final rept. Jun 78-Oct 79,
D. R. Roeck, and Richard Dennis. Dec 79, 305p
EPA-600/7-79-178H
Contract EPA-68-02-2607
See also PB80-150873.

The report assesses applicability of particulate control technology to industrial boilers. It is one of a series to aid in determining the technological basis for a New Source Performance Standard for Industrial Boilers. It gives current and potential capabilities of alternative particulate control techniques, and identifies the cost, energy, and environmental impacts of the most promising options. Fabric filters and electrostatic precipitators (ESPs) can exceed 99% control efficiency and can be used on industrial boilers. A baghouse seems more economical for very small combustion units or to meet a very stringent emissions requirement when burning low sulfur coal.

PB80-177132 PC **A08**/MF **A01**
JRB Associates, Inc., McLean, VA.
Materials Balance 1,2- Dichloroethane. Level I - Preliminary.
Final rept.,
Karen Slimak, Hal Bryson, Kathleen Durrell, Eliot Harrison, and Virginia Hodge. 8 Feb 80, 158p 2-800-03-379-34, EPA-560/13-80-002
Contract EPA-68-01-5793

The purpose of the Level I materials balance for 1,2 dichloroethane (EDC) is to evaluate the sources of release of EDC to the environment. EDC is produced via direct chlorination and oxychlorination of ethylene. EDC is used consumptively in the production of other chemicals such as vinyl chloride, monomer, perchloroethylene, trichloroethylene, ethyleneamines and vinylidene chloride. EDC is also used in the production of leaded gasoline additives as lead scavenger. Releases of EDC from the production and consumptive uses appear to be the major sources of EDC emissions.

PB80-177538 PC **A10**/MF **A01**
Kimball (L. Robert) and Associates, Ebensburg, PA.
User's Manual: Coal-Mine Refuse in Highway Embankments.
Rept. for Sep 77-May 79,
James J. Pierre, and Candace M. Thompson. Dec 79, 206p FHWA-TS-80-213
Contract DOT-FH-11-9355

This manual provides the information needed to use coarse anthracite and bituminous wastes in highway embankment construction. It has 2 parts. Part 1 contains wide ranging data needed for an understanding of coal-mine refuse (CMR) properties, its origins, and regulations governing its disposal. Case histories of highway embankments with CMR are included. Part 2--the user's portion of the manual--sets forth the procedures to follow from planning through construction of highway embankments with CMR. The manual will benefit highway and environmental planners, and those engaged in highway design, materials testing, and construction. While geotechnical engineers should be consulted in the design of all highway embankments, the manual contains some elementary geotechnical data for the benefit of those organizations with limited geotechnical skills.

PB80-177876 PC **A15**/MF **A01**
Environmental Protection Agency, Washington, DC. Office of Environmental Processes and Effects Research.
Proceedings Stormwater Management Model (SWMM) Users Group Meeting, January 10-11, 1980.
Final rept.,
Harry C. Torno. Mar 80, 337p EPA-600/9-80-017
See also PB-290 742.

This report includes fifteen papers, on topics related to the development and application of computer-based mathematical models for water quantity and quality management, presented at the semi-annual meeting of the Joint U.S.-Canadian Stormwater Management Model (SWMM) Users Group, held 10-11 January 1980 in Gainesville, Florida. Topics covered include a description of two urban runoff models, an examination of runoff quality algorithms in the SWMM, a discussion of improvements to the Extended Transport (EXTRAN) portion of the SWMM, applications of several urban drainage models in planning, analysis and design, and a comparison of the Rational Method and the SWMM.

PB80-810096 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Metal Processing Wastes: Air Pollution. 1976-April, 1980 (Citations from the NTIS Data Base).
Rept. for 1976-Apr 80,
Diane M. Cavagnaro. May 80, 257p
Updates COM-73-11438. Supersedes NTIS/PS-79/0486. See also 1964-1975, NTIS/PS-77/0447.

The bibliography is the second volume on air pollution from metal processing and cites control, quantity, economics, and health aspects. The citations cover broad industry studies as well as the analysis of problems of specific industrial plants and processes. The emphasis is on refining, smelting, casting, and metal working for the iron and steel, aluminum, copper, chromium, zinc, and other metal industries. (This updated bibliography contains 250 abstracts, 32 of which are new entries to the previous edition.)

PB80-810104 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Metal Processing Wastes: Water Pollution. 1977-April, 1980 (Citations from the NTIS Data Base).
Rept. for 1977-Apr 80,
Diane M. Cavagnaro. May 80, 90p
Updates COM-73-11438. Supersedes NTIS/PS-79/0488. See also 1971-1976, NTIS/PS-79/0487.

Water pollution control, processes, abatement planning, economics, quantity, and health effects from metal processing are covered in this bibliography on metal refining, smelting, working, and finishing. (This updated bibliography contains 83 abstracts, 26 of which are new entries to the previous edition.)

PB80-810278 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Regional and Urban Solid Waste Disposal: Management Planning. 1964-April, 1980 (Citations from the NTIS Data Base).
Rept. for 1964-Apr 80,
Audrey S. Hundemann. May 80, 278p
Supersedes NTIS/PS-79/0483 and NTIS/PS-78/0403.

Management, state, and local government policies, legislation, financing, data acquisition, and general planning studies for urban and regional solid waste disposal systems are covered. The topics include comments on public health, landfills, pollution, recycling, and load use. Studies on energy recovery and consumption, environmental impacts, land use, guidelines, and models are also covered. (This updated bibliography contains 271 abstracts, 25 of which are new entries to the previous edition.)

PB80-810286 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Regional and Urban Solid Waste Disposal: Local Case Studies. 1964-April, 1980 (Citations from the NTIS Data Base).
Rept. for 1964-Apr 80,
Audrey S. Hundemann. May 80, 248p
Supersedes NTIS/PS-79/0484 and NTIS/PS-78/0404.

Case studies are cited on municipal waste disposal in specific cities, counties, or regions. These studies include aspects of collection, hauling, incineration, sanitary landfills, ocean dumping, and transfer stations as applied to a specific locale. Management studies designed only for these areas are also included. (This updated bibliography contains 241 abstracts, 27 of which are new entries to the previous edition.)

PB80-810294 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Regional and Urban Solid Waste Disposal: Handling and Disposal Technology. 1964-April, 1980 (Citations from the NTIS Data Base).
Rept. for 1964-Apr 80,
Audrey S. Hundemann. May 80, 273p
Supersedes NTIS/PS-79/0485 and NTIS/PS-78/0405.

The citations cover the technology and techniques of collection, hauling, sorting, processing, disposal, incineration, and recycling of urban wastes. These abstracts were chosen to describe methods and equipment for waste handling, disposal, or reclamation. In addition, studies on refuse derived fuels and energy consumption in solid waste processing are covered. (This updated bibliography contains 266 abstracts, 15 of which are new entries to the previous edition.)

PB80-810328 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Mercury Pollution. 1977-April, 1980 (Citations from the NTIS Data Base).
Rept. for 1977-Apr 80,
Robena J. Brown. May 80, 106p
Supersedes NTIS/PS-79/0542 and NTIS/PS-78/0480. See also 1974-1976, NTIS/PS-78/0479.

The bibliography includes pollution control, environmental sampling and analysis, and air and water quality data. The toxicity and pollution effects are excluded. (This updated bibliography contains 99 abstracts, 22 of which are new entries to the previous edition.)

PB80-810377 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Public Opinion and Sociology of Water Resource Development. 1970-May, 1980 (Citations from the NTIS Data Base).
Rept. for 1970-May 80,
Robena J. Brown. May 80, 227p
Supersedes NTIS/PS-79/0515 and NTIS/PS-78/0437.

The citations give insight into the feelings of citizens and officials toward water resource programs involving water quality management, reservoirs, irrigation, and drinking water. The effects of water resource development on the social conditions of a region or a community are also presented. (This updated bibliography contains 220 abstracts, 10 of which are new entries to the previous edition.)

PB80-810427 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Air Pollution Effects on Plants. 1974-February, 1980 (Citations from the American Petroleum Institute Data Base).
Rept. for 1974-Feb 80,
Robena J. Brown. May 80, 275p
Supersedes NTIS/PS-79/0355. For the companion Published Searches of the NTIS Data Base, see NTIS/PS-78/0230 and PB80-807597.

The bibliography cites abstracts which are concerned with the effects of combustion products, industrial and automotive emissions on vegetation, forestry, and agricultural crops. Also included are plant responses when exposed to different levels of ozone. (This updated bibliography contains 268 abstracts, 62 of which are new entries to the previous edition.)

PETC-0234-T3 PC **A04**/MF **A01**
East Tennessee State Univ., Johnson City. Dept. of Environmental Health.
Study of the Treatability of Wastewater from a Coal Gasification Plant. Annual Report, July 15, 1978-July 14, 1979.
A. F. Iglar. Jul 79, 75p
Contract EW-78-S-22-0234

The first year of the study of the treatability of wastewater from the Holston Coal Gasification Plant has been completed. Nearly all the wastewater is recycled to the scrubber-coolers; excess wastewater could not be measured directly, but was estimated at 685 gal/day. Samples were collected from the decanter. Analyses on the raw waste have included BOD (on pretreated), COD, TOC, total solids, total volatile solids, total suspended solids, volatile suspended solids, pH, temperature, ammonia nitrogen, thiocyanate, phenols, sulfide, alkalinity, and grease and oil. These data were analyzed as appropriate to yield mean, standard deviation, weight per day, weight per unit weight of coal consumed, and weight per unit of gas production. Study of pretreatment indicated that essentially any desired degree of removal of ammonia nitrogen could be accomplished by some combination of stripping pH, temperature, aeration rate, and time. A multi-variant linear regression provided an equation which summarized the effects of the four parameters. Evaluation of the removal of grease and oil indicated that gentle aeration would provide improvement over simple pH suppression. Study of biological treatment was undertaken using laboratory-scale activated sludge plants. Treatment effectiveness was over 90% reduction in BOD in early study; later, biological process upsets caused severe deterioration in treatment effectiveness. The biological process upsets appeared related in time to plant operation, especially placing gasifiers in service and out of service, as well as changing the source of coal. It appears that, at Holston and possibly other coal gasification plants, design and operation of wastewater treatment facilities should consider the possibility of upset of biological treatment processes. (ERA citation 05:013001)

PNL-SA-6679 PC **A02**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Experimental Design for a Case Study of Drift from a Mechanical Draft Cooling Tower.
N. S. Laulainen. Apr 78, 14p CONF-780533-3
Contract EY-76-C-06-1830
Symposium on cooling tower environment, College Park, MD, USA, 2 May 1978.

A comprehensive experimental study of drift emissions and downwind deposition from a mechanical draft cooling tower is planned for early spring 1978. The objective of the experiment is to develop a data base which can be used for validation of drift deposition models. The key aspects of the study are to measure the characteristics of the drift emitted from the tower, the ambient meteorological conditions responsible for the transport and dispersion of the drift, and the downwind deposition and near surface air concentration patterns of the drift. The source characteristics, including air temperature and velocity profiles at the tower exit, and the transport parameters are to be used as inputs to the models, while the deposition patterns are to serve as comparisons to the outputs of the models. (ERA citation 05:010533)

PNL-SA-7021 PC **A03**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Impact of the Proposed Atikokan Electric Generating Facility on the Wet Deposition of Sulfur in the Boundary Waters Canoe Area.
B. C. Scott. May 78, 39p
Contract EY-76-C-06-1830

The major impact of the Atikokan Power Plant on the Boundary Waters Canoe Area (BWCA) during precipitation will be related to the increased deposition of acidic sulfate which has been transformed during transit from the SO sub 2 source at Atikokan. The BWCA faces an equally serious impact due to the increased washout of SO sub 2 which, once in the surface waters, is likely to convert to an acidic sulfate. Both experimental data and theoretical models suggest that the wet deposition of sulfate from Atikokan will be seasonally dependent and will be related to features such as storm type, precipitation rate and concentration of sulfate being drawn into the storms. The concentration of SO sub 4 being drawn into the storms is dependent upon the rate of SO sub 2 conversion to sulfate during the transit from the source. Approximately 6 h will be required for emissions from Atikokan to reach the BWCA. During this time 10% or more of the SO sub 2 can be converted to SO sub 4 . The highest wet deposition of sulfate is expected in the summer when summertime convective showers can remove 20 to 30 times the sulfate mass removed by wintertime snowstorms with the same precipitation intensity and duration. Procedures for determining wet deposition of both SO sub 4 and SO sub 2 are described. Estimates of the actual wet deposition associated with Atikokan, and predictions of precipitation acidity are presented. A general background discussion also presents the important concepts relating clouds and precipitation to the sulfate deposition at the ground. (ERA citation 05:011851)

PNL-SA-7421 PC **A02**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Turbidity Variations in the Lower Columbia Basin.
N. S. Laulainen. Jan 79, 7p CONF-790445-9
Contract EY-76-C-06-1830
19. annual meeting of the institute of environmental sciences, Seattle, WA, USA, 29 Apr 1979.

Turbidity variations in the Lower Columbia Basin appear to be related to agricultural activity and synoptic meteorological conditions. Changes in particulate size distribution are apparent in the turbidity color dependence. Turbidities at Hanford have shown considerable variation since 1974. (ERA citation 05:012463)

PNL-SA-7461 PC **A02**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Redistribution of a Layer of HTO by Rainfall.
M. T. Dana, and W. E. Davis. Jan 79, 8p CONF-790445-10
Contract EY-76-C-06-1830
19. annual meeting of the institute of environmental sciences, Seattle, WA, USA, 29 Apr 1979.

A uniform layer of HTO, when encountering a warm or cold front with rainfall, may be simultaneously lifted by frontal air motions over the front and lowered by reversible HTO scavenging. Illustrative calculations show that under typical conditions a layer of HTO bordering the ground may move through a front without rising. The attendant rainfall in this case causes a decay in the concentration which may be significant over the time of frontal pass through. A short case study was included to test whether plume washdown can cause changes in the average air concentration. (ERA citation 05:012464)

PNL-SA-7486 PC **A02**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Long-Range Transport of Pollutants in the Pacific Northwest.
W. F. Sandusky, W. J. Eadie, and D. R. Drewes. Jan 79, 6p CONF-790445-8
Contract EY-76-C-06-1830
19. annual meeting of the institute of environmental sciences, Seattle, WA, USA, 29 Apr 1979.

Air quality impacts associated with future utility and industrial siting as defined by the business as usual scenario have been analyzed. This analysis is based on assumptions regarding emission rates, implementation of Best Available Current Technology (BACT), siting data generated by the ORNL regional studies program, and a regional scale transport, transformation, and removal model for SO sub 2 , sulfates, and particulates. Results of this assessment show that industrial siting in the Portland-Seattle area may be constrained due to regulations for Prevention of Significant Deterioration (PSD) in terms of both incremental SO sub 2 and particulate concentrations at sites near Class I areas. Topography influences the concentration patterns of the pollutants. Generally, these patterns reflect the wind flow characteristics but are modified by dry deposition processes. Maximum predicted ground-level concentrations of SO sub 2 , sulfate, and particulates occur with 63 km of the source. Over 80% of the sulfur emissions in the Pacific Northwest US will ultimately be deposited within the region. The percentage deposited for industrial sources is slightly higher than utility sources due to the lower effective release height. (ERA citation 05:012465)

PNL-SA-7515 PC **A02**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Comprehensive Study of Drift from Mechanical Draft Cooling Towers.
N. S. Laulainen. Feb 79, 19p CONF-7905132-1
Contract EY-76-C-06-1830
Annual METER report conference, Knoxville, TN, USA, May 1979.

A comprehensive experiment to study drift from mechanical draft cooling towers was conducted. The data from this study are to be used for drift deposition model validation. Results show the effects of tower geometry and orientation with respect to the wind and to single or two tower operation. The effect of relative humidity on droplet evaporation as a function of downwind distance can also be seen. (ERA citation 05:014155)

PNL-SA-7576 PC **A02**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Aerosol, Trace Elements and Visibility Measurements in Mountainous Terrain.
M. M. Orgill, N. S. Laulainen, D. R. Drewes, and R. N. Lee. Jan 79, 10p CONF-790445-7
Contract EY-76-C-06-1830
19. annual meeting of the institute of environmental sciences, Seattle, WA, USA, 29 Apr 1979.

A report is presented on an initial effort to collect data on the relationships between aerosols, trace elements, and visibility in mountainous terrain and air pollutants from existing industrial, urban, agricultural and transportation sources in the Pacific Northwest states of Washington, Oregon, and

Idaho. Data were obtained by airborne instruments. Twelve samping flights provided data on scattering extinction coefficient, trace elements, sulfate, and ozone during relatively good (approx. 25 km) prevailing visibility conditions. Over 80% of the sample flights indicated that the meteorological range was 20 km or more. Four or five of the sampling flights indicated the presence of visibility reducing haze. Relatively higher concentrations of certain crustal and anthropogenic trace elements and sulfate (associated with high relative humidities) resulted in degradation of meteorological range in the foothills of Cascades, Snoqualmie Pass and Kittitas Valley and Columbia River Gorge. These 12 sampling flights are not representative of the wide range of visual conditions that can exist in mountainous regions. (ERA citation 05:012466)

PNL-SA-7694 PC **A02**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Potential Safety and Environmental Concerns in Petroleum Transportation.
C. A. Geffen. 1979, 14p CONF-790778-1
Contract EY-76-C-06-1830
International symposium on transportation safety, San Diego, CA, USA, 11 Jul 1979.

This paper presents results of a study conducted for the Department of Energy by Pacific Northwest Laboratory to provide early recognition of and prioritize potential problems in petroleum transportation. Other objectives of this study are to identify possible gaps in the coverage of ongoing programs and recommend necessary action to mitigate th potential impact of identified problems. The remainder of this paper presents summaries of selected safety and environmental concerns in petroleum transportation. Each of these potential problems is discussed, together with recommendations for actions that address the problem. The concerns addressed in this paper deal with (1) gaps in oil spill prevention technology and practices, and (2) assessing the effects of oil spills that occur. The main topics covered are: the effects of marine oil pollution, oil spills trajectory modeling, environmental impact of pipeline leaks, cost-effective tanker safety design standards, training of waterway personnel, and insufficient Coast Guard manpower. (ERA citation 05:011233)

RLO-1830-T4 PC **A03**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Removal of H sub 2 S from Geothermal Steam. Semi-Annual Report, April 1-October 31, 1975.
C. T. Li. 28p
Contract EY-76-C-06-1830

The program objective is to identify and evaluate a technique to remove hydrogen sulfide from geothermal steam before it is used for power generation. The last six months were spent in the literature search, sorbent preparation and evaluation, and construction of an experimental apparatus. Zn0, mentioned in the original proposal as a good candidate for H sub 2 S adsorption, was verified as such by the literature search and laboratory experiments. However, regeneration of sulfided sorbent proved to be difficult. The interests were, then, switched to formulating sorbents made of mixtures of different kinds of metal oxides. At present, two sorbents were formulated which, when evaluated with a gas adsorption apparatus in the laboratory, possess better H sub 2 S adsorption-regeneration capabilities than Zn0 or sorbents obtained from catalyst manufacturers. Large-scale gas adsorption equipment for use with simulated geothermal steam has been designed, built and shakedown operation of the equipment is in progress. (ERA citation 05:013422)

SAND-78-1366 PC **A06**/MF **A01**
Sandia Labs., Albuquerque, NM.
Sandia Irradiator for Dried Sewage Solids. Preliminary Safety Analysis Report.
M. E. Morris. Dec 79, 102p
Contract EY-76-C-04-0789

This safety analysis report describes the Sandia Irradiator for Dried Sewage Solids (SIDSS) designed by Sandia Laboratories and assesses the hazards associated with its operation. The SIDSS consists of a conveyor system, a source plaque and associated shielding, and a gamma-source pin loading/unloading pool. The facility will be installed next to Building 6720 in Technical Area III (TA-III) in July 1978. This facility will provide Sandia Laboratories with the capability of exposing up to 8 tons per day of sewage solids to 1 Mrad absorbed dose. (ERA citation 05:012146)

SRI-9413 PC **A02**/MF **A01**
SRI International, Menlo Park, CA. Energy Center.
Evaluation of Aerospace Corporation's Report Solid Waste Impact of Controlling SO sub 2 Emissions from Coal-Fired Steam Generators.
C. F. Clark. Feb 78, 7p
Contract EY-76-C-03-0115

Aerospace Corporation has prepared a report that estimates the future impact of changes in the New Source Performance Standards (NSPS) for SO sub 2 emissions on the amount of solid waste generated by various control methods. The US Department of Energy has requested that SRI International evaluate this report in the context of pertinence to the EPA Draft Standards of Performance for New Stationary Units - Electric Utility Steam Generating Units: appropriateness of the study assumptions; adequacy of the data base; and validity of results and conclusions. The assumptions about coal washing used in the report result in unrealistically low amounts of solid waste tailings being produced at the mine. Similarly, the amount of SO sub 2 sludge produced in the utility plant is low when using washed coal. As a result, the total amount of SO sub 2 sludge, plus the tailings produced when an emission level of 0.5 lb SO sub 2 per 10 exp 6 Btu is achieved, appears to be lower than the amount produced under compliance with either the 1.2 lb SO sub 2 per 10 exp 6 Btu or 90% removal standards. In addition, the economic and environmental impact of coal washing is not fully evaluated and included in the analysis. The assumptions used in the report for estimating solid waste disposal costs appear realistic. The disposal costs may vary from $2.70 to $13.10 per ton of dry solid waste from the 1000 MW plant, depending on the disposal method used; for the smaller capacity plants are considerably higher. The more stringent 90% SO sub 2 removal emission standard will strongly affect the development rate of western coals. The 90% SO sub 2 removal would require FGD in all locations, which would greatly reduce the incentive to move western coals to other parts of the United States. (ERA citation 05:011852)

Y-2192 PC **A02**/MF **A01**
Oak Ridge Y-12 Plant, TN.
Biodegradation of Waste, Organic Machining Coolants.
R. M. Davis. 27 Nov 79, 23p
Contract W-7405-ENG-26

In 1976, developmental studies were undertaken to pursue methods of decomposition for waste machine coolants into carbon dioxide, water, and biomass using an activated-sludge biological process. During these studies, laboratory-size and pilot-plant-size reactors were operated. Reactor-operational practices were developed, and this report identifies certain significant constraints on these practices which include the following: (1) the reactor solution should be maintained in the range of 7.0 to 8.5; (2) electrically driven aerators should be operated continuously to provide oxygen and to mix the reactor contents; (3) the nitrate ion concentration should be maintained in the reactor solution in the range of 100 to 150 mg/l: the phosphate ion concentration should be 10 to 20 mg/l; and (4) waste machine coolant should be added to the reactor at the rate required to maintain a chemical-oxygen demand of < 1500 mg/l and a dissolved oxygen concentration > 1 mg/l. The development studies are complete; and, since October 1978, routine operation of the bioreactor pilot plant has been controlled by Chemical Services Department personnel. (ERA citation 05:012134)

13C. Construction Equipment Materials, and Supplies

AD-A082 439/1 PC **A02**/MF **A01**
Army Engineer Waterways Experiment Station Vicksburg MS
Investigation of Proprietary Admixtures. Report 2. 1977-1978 Tests.
Technical rept.,
Kenneth L. Saucier. Jan 80, 23p Rept no. WES-TR-C-77-1-2
See also AD-A039 612.

Three high-range water-reducing admixtures for concrete were tested to determine compliance with specification CRD-C 87-78 (Class A or D). One admixture met the requirements when used at a dosage to give 18 percent water reduction; the second met the requirements when used at a 12 percent water reduction, but failed to do so when used to achieve a 17 percent reduction; the third failed to do so when used to achieve a 20 percent water reduction. (Author)

AD-A082 737/8 PC **A07**/MF **A01**
Dynatech R/D Co Cambridge MA
Building Insulation Materials Compilation.
Final rept.,
James G. Bourne, David L. Brownell, Eric C. Guyer, Richard G. Thompson, and Ronald P. Tye. Sep 79, 139p CEL-CR-80.001
Contract N68305-79-C-0008

This document is intended to provide a ready source of the thermal characteristics, availability, safety, and other pertinent information for the selected types of insulation. The compilation covers all commonly used types of products whose primary purpose is to provide thermal resistance to heat flow through the building envelope. Due to the importance of controlling the migration of moisture to the insulating material, vapor barriers are also presented. Where possible the generic properties of a particular insulating material are presented to allow the designer to draw comparisons between types. In addition, where data are available, the variation of conductivity with temperature and/or density is given for each generic material. (Author)

PB80-166903 PC **A03**/MF **A01**
New York State Dept. of Transportation, Albany. Engineering Research and Development Bureau.
Effects of Concrete Cover Depth and Absorption on Bridge Deck Deterioration.
Interim rept. no. 3,
William G. Leslie, and William P. Chamberlin. Feb 80, 36p RR-75, FHWA/NY/RR-80/75

This report deals with the usefulness of knowledge of concrete cover-depth distribution and concrete absorption in predicting the occurrence and extent of deterioration on monolithic bridge deck surfaces. The minimum cover required to protect bridge deck spans in New York State for periods up to 30 years is projected, based on data in this report and on relationships developed by FHWA researchers on simulated bridge decks.

PB80-169261 PC **A03**/MF **A01**
New York State Dept. of Transportation, Albany. Engineering Research and Development Bureau.
Effects of Adopting a Viscosity Specification for Asphalt Cement in New York State.
Special rept. (Final),
Richard W. Miller, Ronald A. Brown, and William P. Chamberlin. Mar 80, 35p SR-66, FHWA/NY/SR-80/66

In 1972, the New York State Department of Transportation changed from a penetration (77 F) grading specification to a viscosity (140 F) grading specification for asphalt cement. About then, with increasing frequency field engineers reported problems with placement of bituminous concrete and in-service performance that they attributed to changes in asphalt-cement consistency. This report documents the penetration and viscosity properties of asphalt cements supplied to the state during the years 1968 to 1975 inclusive. The changes determined are discussed with reference to the problems reported by field engineers.

PB80-169766 PC **A02**/MF **A01**
Denver Research Inst., CO. Office of International Programs.
Malaysia: Small-Scale Brick Manufacturing,
Ronald P. Black, A. Rahim Bidin, Woo Seng Khee, and Nik Ahmad Kamil. Dec 79, 24p
Contract AID/ta-C-1337
Report on Industrial Research Institutes: Their Role in the Application of Appropriate Technology and Development, Case Series No. 3.

This case history has been written to assist development planners, personnel of industrial research

institute, and USAID mission personnel in understanding the role that IRIs can and do play in the application of technology to development. It describes a typical small-scale brick factory. The future challenges that the industry may have to face are related by the factory owner. An industry forecast from an expert at the Standards and Industrial Research Institute of Malaysia is presented.

13D. Containers and Packaging

PAT-APPL-6-066 949 PC **A02**/MF **A01**
Department of the Army Washington DC
Disposable Controlled Atmosphere System for Extending the Shipping and Storage Life of Lettuce.
Patent Application,
Harold Gorfien, Abdul R. Rahman, and Tedio Ciavarini. Filed 16 Aug 79, 12p AD-D007 116/7
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

The shipping and storage life of lettuce is extended by enclosing a plurality of heads of lettuce in a plastic bag liner, preferably made of low density polyethylene, together with porous envelopes of hydrated lime and active carbon, and tightly closing the bag liner, preferably by heat sealing thereof. A controlled atmosphere of less than 1 percent carbon dioxide, about 1 to 6 percent oxygen, and zero or near zero percent ethylene is maintained around the lettuce while it is being refrigerated. Storage life is extended several-fold over the storage life of conventionally packed lettuce. (Author)

PATENT-4 193 388 Not available NTIS
National Aeronautics and Space Administration. Pasadena Office, CA.
Portable Heatable Container.
Patent,
L. C. Yang. Filed 19 Apr 78, patented 18 Mar 80, 5p N80-20808/5, PAT-APPL-897 831 NASA-CASE-NPO-14237-1
Supersedes PAT-APPL-897 831-78, N78-24554 (16-15, p 2002). Sponsored by NASA.
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC. 20231 $0.50.

A container is provided which can be designed to heat its outer surface to sterilize it, or to heat its inner surface and any contents therewithin. In a container that self sterilizes its outer surface, the container includes a combustible layer of thermite-type pyrotechnic material which can be ignited to generate considerable heat, and a thin casing around the combustible layer which is of highly thermally conductive materials such as aluminum which can be heated to a high temperature by the ignited combustible layer. A buffer layer which may be of metal, lies within the combustible layer, and a layer of insulation such as Teflon lies within the buffer layer to insulate the contents of the container from the heat.

PB80-810336 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Shipborne Containers and Containerization. 1964-April, 1980 (Citations from the NTIS Data Base).
Rept. for 1964-Apr 80,
Guy E. Habercom, Jr. May 80, 225p
Supersedes NTIS/PS-79/0521 and NTIS/PS-78/0461. For the companion Published Search of the Engineering Index Data Base, see PB80-810344.

Shipborne container design and containerization utilization are investigated in these Government-sponsored research reports. Military and merchant ship logistics relative to containers, containership motion and maneuverability, and onboard/offboard loading requirements are among parameters studied. (This updated bibliography contains 220 abstracts, 11 of which are new entries to the previous edition.)

PB80-810344 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Shipborne Containers and Containerization. 1972-April, 1980 (Citations from the Engineering Index Data Base).
Rept. for 1972-Apr 80,
Guy E. Habercom, Jr. May 80, 136p
Supersedes NTIS/PS-79/0522 and NTIS/PS-78/0462. For the companion Published Search of the NTIS Data Base, see PB80-810336.

Shipborne container design and containerization utilization are investigated in these reports gathered from worldwide literature. Military and merchant ship logistics relative to containers, containership motion and maneuverability, and onboard/offboard loading requirements are among parameters studied. (This updated bibliography contains 130 abstracts, 19 of which are new entries to the previous edition.)

13E. Couplings, Fittings, Fasteners, and Joints

AD-A082 989/5 PC **A02**/MF **A01**
California Inst of Tech Pasadena Graduate Aeronautical Labs
NSRDC Faired Towline Tests in the High Speed Water Tunnel.
Technical rept.,
Paul E. Baloga. Oct 79, 25p Rept no. GALCIT-HSWT-1137
Contract N00014-78-C-0790

Lift, drag, and pitching moment data for aluminum and rubber models of a segment of the NSRDC towline are presented. Deflections on the rubber model were measured through a pitch angle range of +1 through -4 deg with water velocities ranging up to 68 feet per second. (Author)

N80-20621/2 PC **A04**/MF **A01**
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Engineering Science and Mechanics.
Use of Two-Dimensional Transmission Photoelastic Models to Study Stresses in Double-Lap Bolted Joints: Load Transfer and Stresses in the Inner Lap.
Progress Report.
M. W. Hyer. Mar 80, 65p VPI-E-80-9
Grant NSG-1621

The determination of the stress distribution in the inner lap of double-lap, double-bolt joints using photoelastic models of the joint is discussed. The principal idea is to fabricate the inner lap of a photoelastic material and to use a photoelastically sensitive material for the two outer laps. With this setup, polarized light transmitted through the stressed model responds principally to the stressed inner lap. The model geometry, the procedures for making and testing the model, and test results are described.

PB80-164247 PC **A02**/MF **A01**
National Bureau of Standards, Washington, DC. Diffusion in Metals Data Center.
Diffusion Layers and Strength of Soldered Ti Joints Using Noble Galvanic Coatings (Diffuzionnye Sloi i Prochnost' Payanykh Soedinenii Titana S Primeneniem Gal'vanopokrytii Blagorodnykh Metallov),
V. V. Bondarev, and A. Ya. Shinyaev. 1979, 9p DMDC-20686, TT-79-58157
Trans. of Novye Issled Titan Splavov, Moscow, p309-311 1965. Sponsored in part by National Science Foundation, Washington, DC. Special Foreign Currency Science Information Program.

Galvanic coatings of Au, Pt, Pd, and Rh were applied to Ti and Ti alloys. The coated specimens were then either soft or hard soldered together. The soldered samples were then tested in tension till failure. Strength of the soldered joints was then correlated with previous heat treatments, microstructure and test variables.

13F. Ground Transportation Equipment

AD-A082 825/1 PC **A03**/MF **A01**
National Research Council of Canada Ottawa (Ontario) Div of Mechanical Engineering
Urban Traffic Signal Control for Fuel Economy (Economie d'Essence Grace a la Commande des Feux de Circulation en Zone Urbaine),
G. S. Messenger, D. B. Richardson, P. W. U. Graefe, and I. H. Mufti. Jan 80, 44p DME-ME-247, NRC-18127
Abstract in French.

A study was made to determine the influence of two computer-controlled traffic signal timing plans over a given route. The two plans are the existing plan based on SIGRID (Signal GRId Design program) and TRANSYT (Traffic Network Study Tool). The results show that under the TRANSYT timing plan, vehicles encountered fewer stops, saved time and used a slightly smaller amount of fuel than under the existing timing plan. Vehicle fuel consumption was computed using a computer model of a vehicle which used velocity profiles obtained from an instrumented 'floating' car. Single and multiple linear regression analyses were used to determine the relationship between the fuel consumption and the relatively easy-to-measure and statistically stable quantities such as trip time, number of stops and delay time. It was found that fuel consumption could be expressed adequately as a linear combination of trip time, number of stops and delay time. Using only two independent variables showed a combination of delay time and stops to be equally as good as a combination of travel time and stops. When restricted to a single independent variable, any one of them could be used for predicting fuel consumption. (Author)

CONF-7904105- PC **A99**/MF **A01**
Department of Energy, Washington, DC. Office of Transportation Programs.
Highway Vehicle Systems Contractors' Coordination Meeting. Sixteenth Summary Report.
Sep 79, 644p
16. highway vehicle systems contractors coordination meeting, Dearborn, MI, USA, 24 Apr 1979.

Separate abstracts have been prepared for individual papers. (ERA citation 05:013825)

COO-2749-27 PC **A04**/MF **A01**
Chrysler Corp., Detroit, MI.
Baseline Gas Turbine Development Program. Twenty-First Quarterly Progress Report.
31 Jan 78, 74p
Contract EY-76-C-02-2749

Progress is reported for a program whose goals are to demonstrate an experimental upgraded gas turbine-powered automobile which meets the 1978 Federal Emissions Standards, has significantly improved fuel economy, and is competitive in performance, reliability, and potential manufacturing cost with the conventional piston engine-powered, compact-size American automobile. Activity during this twenty-first program quarter has continued to emphasize development towards correcting a power deficiency in the upgraded engine. Efforts are also being directed towards reducing fuel usage through improved heat recovery and towards improving the mechanical reliability and control of the engine. (ERA citation 05:012152)

DOE/CS-0026-8 PC **A03**/MF **A01**
Department of Energy, Washington, DC. Office of Transportation Programs.
Electric and Hybrid Vehicle Program. Quarterly Report, July-September 1979.
Nov 79, 27p
Contract EC-77-A-31-1044

Progress in US Programs on the design, development, production, performance testing, and commercialization of electric and hybrid electric-powered vehicles is briefly summarized. (ERA citation 05:012155)

DOE/NASA/1044-79/5 PC **A02**/MF **A01**
National Aeronautics and Space Administration, Cleveland, OH. Lewis Research Center.
Averaging Battery Model for a Lead-Acid Battery Operating in an Electric Car.
J. M. Bozek. Dec 79, 20p NASA-TM-79321
Contract EC-77-A-31-1044

Computer programs used to calculate the performance of an electric vehicle must contain a battery model. A simple mathematical model is developed and evaluated. The model is based on time aver-

aged current or power required from a battery during the operation of the electric vehicle. The time averaging technique used accounts for time varying discharge rates, rest times, and the electrical regenerative braking that are normally experienced by a battery in an electric vehicle. The averaging battery model reported herein, has been verified through comparisons with test data gathered on batteries in the laboratory and from vehicles operated at test tracks. The averaging battery model accurately predicts the performance measured for lead-acid batteries operating in accordance with the power and current requirements of the various deriving schedules specified in the SAE Recommended Practice, Electric Vehicle Test Procedure - SAE J227a. (ERA citation 05:013865)

N80-20340/9 PC **A02**/MF **A01**
Massachusetts Inst. of Tech., Cambridge. Sloan Labs. for Automotive and Aircraft Engines.
Combustion and Operating Characteristics of Spark-Ignition Engines.
Final Report, Jan. 1979 - Jan. 1980.
J. B. Heywood, J. C. Keck, G. P. Beretta, and P. A. Watts. 28 Mar 80, 13p NASA-CR-162896
Grant NSG-3245

The spark-ignition engine turbulent flame propagation process was investigated. Then, using a spark-ignition engine cycle simulation and combustion model, the impact of turbocharging and heat transfer variations or engine power, efficiency, and NO sub x emissions was examined.

N80-21200/4 PC **A02**/MF **A01**
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, OH.
Supporting Research and Technology for Automotive Stirling Engine Development.
W. A. Tomazic. 1980, 20p NASA-TM-81495, E-400
Presented at 5TH Intern. Automotive Propulsion System Symp., Dearborn, Mich., 14-18 Apr. 1980.

The technology advancement topics described are a part of the supporting research and technology (SRT) program conducted to support the major Stirling engine development program. This support focuses on developing alternatives or backups to the engine development in critical areas. These areas are materials, seals control, combustors and system analysis. Specific objectives and planned milestone schedules for future activities as now envisioned are described. These planned SRT activities are related to the timeline of the engine development program that they must support.

N80-21201/2 PC **A04**/MF **A01**
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, OH.
Fuel Economy Screening Study of Advanced Automotive Gas Turbine Engines.
J. L. Klann. Mar 80, 57p NASA-TM-81433, E-357
Contract EC-77-A-31-1040

Fuel economy potentials were calculated and compared among ten turbomachinery configurations. All gas turbine engines were evaluated with a continuously variable transmission in a 1978 compact car. A reference fuel economy was calculated for the car with its conventional spark ignition piston engine and three speed automatic transmission. Two promising engine/transmission combinations, using gasoline, had 55 to 60 percent gains over the reference fuel economy. Fuel economy sensitivities to engine design parameter changes were also calculated for these two combinations.

N80-21203/8 PC **A04**/MF **A01**
Jet Propulsion Lab., Pasadena, CA.
Amtv Headway Sensor and Safety Design.
Final Report, Dec. 1978 - Jan. 1980.
A. R. Johnston, M. Nelson, P. Cassell, and J. T. Herridge. Jan 80, 71p NASA-CR-162717, UMTA-CA-06-0088-80-1
Contract DOT-AT-60008T
Sponsored by NASA Prepared in Cooperation with Battelle Columbus Labs., Ohio.

A headway sensing system for an automated mixed traffic vehicle (AMTV) employing an array of optical proximity sensor elements is described, and its performance is presented in terms of object detection profiles. The problem of sensing in turns is explored experimentally and requirements for future turn sensors are discussed. A recommended headway sensor configuration, employing multiple source elements in the focal plane of one lens operating together with a similar detector unit, is described. Alternative concepts including laser radar, ultrasonic sensing, imaging techniques, and radar are compared to the present proximity sensor approach. Design concepts for an AMTV body which will minimize the probability of injury to pedestrians or passengers in the event of a collision are presented.

PB80-165624 PC **A03**/MF **A01**
Association of American Railroads, Chicago, IL. Research and Test Dept.
Vertical Track Modulus: Test Results and Comparison of Analysis Techniques.
Interim rept.,
J. Choros, A. M. Zarembski, and I. Gitlin. Nov 79, 47p FRA/ORD-79-34
Contract DOT-FR-30038

A vertical track response test was conducted at the AAR Track Structures Dynamic Test Facility. This test was intended to characterize the behavior of the track structure under increasing vertical loads. It was also intended to evaluate the different techniques available for the calculation of the vertical track modulus. The response of the track was obtained by monitoring track deflection under increasing vertical loads. This load and deflection data was then used to calculate vertical track modulus, track stiffness and track compliance. Three widely used techniques were used to calculate the vertical modulus.

PB80-166051 PC **A05**/MF **A01**
Mobility Systems Equipment Co., Los Angeles, CA.
Safety Compliance Test Program FMVSS 212, 219, 301-75, NCAP, Accident Investigation Division Data.
Final rept. 15 Aug-15 Dec 79,
Lloyd E. Carlson. Dec 79, 86p R-NS79-14-02, DOT-HS-805 246
Contract DOT-HS-9-02136

The report presents information acquired during the preparation and execution of tests of the following 1979 vehicles: BMW 528i, Ford Fiesta, Saab 900 GL, Toyota Corolla, and Volvo 244 DL. The tests were conducted to address FMVSS 212, 219, 301-75 and the New Car Assessment Program (NCAP) requirements. The vehicles contained two Part 572 dummies fully instrumented and accelerometers were mounted as specified on the vehicle. In addition to the data acquired for compliance evaluation and the NCAP, data were acquired for the Accident Investigation Division also.

PB80-166234 PC **A06**/MF **A01**
Dynamic Science, Inc., Phoenix, AZ.
RSV (Research Safety Vehicle) Test Monitoring and Data Publication-Renault R20TS-To-Calspan RSV 75 Degree Left Side Impact at Peugeot.
Final rept.,
R. Cropper, N. Johnson, and S. Davis. May 79, 125p 6071-79-88-A, DOT-HS-805-252
Contract DOT-HS-9-02095

The report presents the results of a 75 degree left side impact collision between a Renault R20TS and the Calspan RSV No. 4. The Calspan RSV was the stationary target vehicle and was struck in the side by the Renault bullet vehicle. The test was conducted by Automobiles Peugeot in France. This crash test evaluated the structural integrity and dynamic response of the Calspan RSV, and the dynamic response of its three occupants when involved in a 75 degree side impact crash. The side door intrusion into the passenger compartment was limited to 3.8 inches maximum at the driver door, and all occupant responses met established human survival specifications.

PB80-166242 PC **A05**/MF **A01**
Dynamic Science, Inc., Phoenix, AZ.
RSV (Research Safety Vehicle) Test Monitoring and Data Publication-Renault R20TS-To-Calspan RSV 75 Degree Right Side Impact at Renault.
Final rept.,
R. Cropper, N. Johnson, and S. Davis. Jun 79, 99p 6071-79-106, DOT-HS-805-251
Contract DOT-HS-9-02095

The report presents the results of a 75 degree right side impact collision between a Renault R20TS and the Calspan RSV No. 4. The Calspan RSV was the stationary target vehicle and was struck in the side by the Renault bullet vehicle. The test was conducted by Renault. The crash test evaluated the structural integrity and dynamic response of the Calspan RSV, and the dynamic response of its three occupants when involved in a 75 degree side impact crash.

PB80-166259 PC **A07**/MF **A01**
Dynamic Science, Inc., Phoenix, AZ.
Research Safety Vehicle (RSV) Crash Test Report. Test No. 3054-1, 41 MPH Flat Barrier Frontal Impact.
Final rept. May-Jun 79,
R. Baczynski, S. Davis, and M. Fitzpatrick. Aug 79, 138p 3054-79-90A, DOT-HS-805-262
Contract DOT-HS-8-01942

The report presents the results of a 41 mph frontal flat barrier crash test. The vehicle selected for this test was Calspan RSV No. 9. For this test, two calibrated 50th percentile Part 572 instrumented anthropomorphic dummies were placed in the driver and front passenger positions in the car. The occupant automatic restraint system consisted of an air bag mounted in the steering wheel hub for the driver, and an air belt for the passenger. These were supplemented by knee impact padding for each occupant.

PB80-168842 PC **A04**/MF **A01**
Battelle Columbus Labs., OH.
Concrete and Wood Tie Track Performance Through 150 Million Gross Tons.
Final rept. Aug 77-Aug 78,
Francis E. Dean, and Robert H. Prause. Mar 80, 71p FRA/TTC-80/02
Contract DOT-TSC-1044
Sponsored in part by Association of American Railroads, Washington, DC., and Transportation Test Center, Pueblo, CO. FAST Program.

This report has been prepared as part of the improved Track Structures Research Program sponsored by the Office of Rail Safety Research of the Federal Railroad Administration. The report presents an evaluation of concrete and wood tie track performance from test data taken at the Facility for Accelerated Service Testing (FAST). The primary purpose of this effort is to contribute to the establishment of the technical and economic feasibility of concrete cross ties in U.S. mainline service. The report neither proves nor disproves this feasibility, but a number of important problems in the design and application of concrete ties are identified.

PB80-170335 PC **A02**/MF **A01**
De Lorean Motor Co., Troy, MI. Research and Engineering Div.
Cost Evaluation for Nine Federal Motor Vehicle Safety Standards-Task VIII-FMVSS 301, Fuel System Integrity-Determination of the Model Year When Manufacturers Made Changes to Meet Standard's 1976 Requirements.
Final rept. Jul-Sep 79,
Robert F. McLean, and Gregory Lisiecki. Sep 79, 17p DOT-HS-805 300
Contract DOT-HS-8-02015

The findings of a previous study were reviewed to determine which passenger automobiles had the greatest weight and cost changes during the period 1967-1976 relative to FMVSS 301, Fuel System Integrity. From the listing of 17 models, five were selected for further study based on: (1) those with the greatest cost or weight change between the 1967 and 1976 models; (2) models which represent a major portion of the vehicles sold from year-to-year; and (3) including the major domestic and foreign manufacturers studied. The authors obtained the parts books for 1967 through 1976 for the models selected. Based on parts numbers, descriptions and pictures a determination was made when the manufacturer modified each fuel system to meet 1976 requirements. The major changes were--1973 - Ford Maverick, 1974 - Toyota Corona, Ford Torino, and 1976 - Chevrolet Nova and Malibu.

PB80-174881 PC **A05**/MF **A01**
Hammitt (Andrew G.) Associates, Rancho Palos Verdes, CA.
Aerodynamic Forces on Various Configurations of Railroad Cars for Carrying Trailers and Containers. Wind Tunnel Tests of Six Scale Model Configurations.
Final rept. Jul 78-Jan 79,
Andrew G. Hammitt. Jan 79, 95p 12-101-79, FRA/ORD-79/39
Contract DOT-FR-8058
See also Volume 4, PB80-174899.

Toward improving the energy efficiency of rail intermodal service, the aerodynamic characteristics of the rolling stock offer a significant opportunity for betterment. At speeds above 45 miles per hour more than half of the resistance of an intermodal train is caused by the aerodynamic drag of the cars and their loads. Methods by which the aerodynamic drag may be minimized are, therefore, of considerable interest to railroads and car designers. This report covers the wind tunnel testing of scale models of railcars for carrying trailers and containers. The purpose was twofold: First, to determine whether significant differences in the aerodynamic characteristics of such scale models could be measured in the wind tunnel showing that it could be utilized as an evaluation tool in future railcar design programs and, second to obtain comparative performance data on five new intermodal railcar configurations.

PB80-174899 PC **A09**/MF **A01**
Hammitt (Andrew G.) Associates, Rancho Palos Verdes, CA.
Aerodynamic Forces on Freight Trains. Volume IV: Wind Tunnel Tests of Freight Cars and New Trailer and Container Car Designs.
Final rept. May 78-Jun 79,
Andrew G. Hammitt. Jun 79, 184p AGH-12-002-79, FRA/ORD-76/295.IV
Contract DOT-FR-8058
See also Volume 3, PB-288 137 and PB80-174881.

Aerodynamic forces have been measured on a variety of different railroad freight car configurations. The first configuration consisted of blocks arranged in a train and the tests were to obtain information on the interaction between the blocks for different spacings and height. Next, a series of railroad freight cars and locomotives were tested to obtain aerodynamic forces on them, both in a train of similar cars and with different cars. All cars were tested with a flatcar in the leading and trailing positions as a measure of the largest forces that might occur. The final series of tests were for various new railroad cars designed for trailers and containers. These cars were tested with their different design loadings.

UCRL-15037 PC **A03**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Continuously Variable Transmissions: Theory and Practice.
N. H. Beachley, and A. A. Frank. Aug 79, 50p
Contract W-7405-ENG-48

The five basic principles that can be used in the design of continuously variable transmissions (CVT) for motor vehicles are examined and compared. These include: hydrostatic, traction drive (V-belt and rolling contact), overrunning clutch, electric, and multispeed gearbox with slipping clutch. Appendix A discusses commercially available CVTs suitable for motor vehicles, and Appendix B describes research and development programs for CVTs. (ERA citation 05:013868)

13H. Industrial Processes

AD-A082 514/1 PC **A04**/MF **A01**
Army Industrial Base Engineering Activity Rock Island IL
Manufacturing Methods and Technology Program Accomplishments.
H. E. Weidner. Feb 80, 65p

This document contains pictorial illustrations and word descriptions of MM and T project accomplishments. Each page lists project title, funding, benefits of the work, results obtained, and illustrates the process, equipment, or end item supported. At the start of each section is the MMT Representatives name, address and phone number. (Author)

AD-A082 812/9 Not available NTIS
Bern Univ (Switzerland) Inst Fuer Angewandte Physik
Influence of Laser-Supported Detonation Waves on Metal Drilling with Pulsed CO2 Lasers.
Forschungsbericht,
E. Stuermer, and M. von Allmen. 12 May 78, 9p
Availability: Pub. in Jnl. of Applied Physics, v49 n11 p5648-5654 Nov 78 (No copies furnished by DTIC). Microfiche copies only.

No abstract available.

AD-A083 036/4 PC **A09**/MF **A01**
Army Industrial Base Engineering Activity Rock Island IL
Manufacturing Methods & Technology. Project Execution Report. Second Half CY79.
Semiannual rept. 1 Jul-31 Dec 79,
H. E. Weidner, and L. S. Hancock. Mar 80, 189p

This document is a summary compilation of the Manufacturing Methods and Technology Program Project Status Reports (RCS DRCMT-301) submitted to IBEA from ARCOM major subordinate commands and project managers. Each page of the computerized section lists project number, title, status, funding and projected completion date. Summary pages give information relating to the overall DARCOM program. Summary project status reports from the following commands are provided: Test and Evaluation command; Aviation R&D Command; and Armament Materiel Readiness Commands (Ammunition and Weapons); Mobility Equipment R&D Command; Communications R&D Command; Electronics R&D Command; Army Material and Mechanics Research Center--Materiel Development & Readiness Command; Natick R&D Command; Missile Command; and Tank-Automotive R&D and Materiel Readiness Commands.

LA-UR-79-3353 PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
Plans for Miniature Machining at LASL.
R. L. Rhorer. 1979, 7p CONF-7910109-1
Contract W-7405-ENG-36
Meeting of the IMOG machine tool subgroup, Oak Ridge, TN, USA, 24 Oct 1979.

A special shop for making miniature or very small parts is being established within the LASL Shop Department, and one of the machine tools for this shop is a high precision lathe. The report describes a method based on scale modeling analysis which was used to define the specific requirements for this lathe. (ERA citation 05:008960)

N80-20590/9 PC **A02**/MF **A01**
National Aeronautics and Space Administration, Washington, DC.
Grinding and Polishing Articles in Bulk: Burnishing.
K. Schmotz. Mar 80, 22p NASA-TM-75774
Contract NASW-3198
Transl. Into English from Galvanotechnik (Germany, F.R.). V. 63, No. 9, 15 Sep. 1972 p 818-827. Transl. By Scientific Translation Service, Santa Barbara, Calif.

Various processes and equipment used for burnishing different materials are discussed. Drum and vibration installations are considered, as are processing chemicals and additive materials used in the burnishing process.

PAT-APPL-6-126 072 PC **A02**/MF **A01**
Department of the Air Force Washington DC
Mask-Slice Alignment Method.
Patent Application,
Roderick K. Watts. Filed 29 Feb 80, 9p AD-D007 133/2
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

This document discloses a method of aligning an x-ray mask to a pattern on a semiconductor slice utilizing an infrared light source and an alignment pattern pair on the mask and slice to automatically and precisely position the x-ray mask on the semiconductor slice. (Author)

PAT-APPL-6-126 138 PC **A02**/MF **A01**
National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, AL.
Controlled Overspray Spray Nozzle.
Patent Application,
W. P. Prasthofer. Filed 29 Feb 80, 16p N80-20528/9, NASA-CASE-MFS-25139-1
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A nozzle for suppressing overspray of multiingredient ablative materials is described. The nozzle includes a cylindrical inlet which converges to a restricted throat. A curved juncture between the cylindrical inlet and the convergent portion, with a predetermined radius of curvature, affords unrestricted and uninterrupted flow of the ablative material. A divergent bell shaped chamber and an adjustable nozzle exit are utilized which provide a highly effective spray pattern for suppressing overspray to an acceptable level and producing a homogeneous jet of material that adheres well to the substrate.

PAT-APPL-6-954 058 PC **A02**/MF **A01**
Department of the Navy Washington DC
Improved Method of Infrared Laser Soldering.
Patent Application,
Walter K. Cox, William E. Prifli, and David R. Whitehouse. Filed 23 Oct 79, 13p AD-D007 148/0
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A method and apparatus for attaching miniaturized chip components to substrates is provided. The output of a 1.06 micron wavelength laser is aperturned or attenuated and the attenuated energy is monitored before passing through a cylinder lens which focuses and directs the energy to the intersection of the chip component and the substrate pad so that heat travel in the material is limited and soldering of narrow capacitor or component widths is permitted. (Author)

PB80-169741 PC **A02**/MF **A01**
Denver Research Inst., CO. Office of International Programs.
Brazil: Explosive Metalworking Program.
James M. Miller, Jim D. Mote, and Henry E. Otto. Dec 79, 24p
Contract AID/ta-C-1337
Report on Industrial Research Institutes: Their Role in the Application of Appropriate Technology and Development, Case Series No. 4.

The case history has been written to assist development planners, personnel of industrial research institutes, and USAID mission personnel in understanding the role that IRIs can and do play in the application of technology in development. In this project, the introduction of a metallurgical technology--explosive forming, cladding, and hardening--has been adapted into a small but profitable industry in the state of Sao Paulo.

PB80-170285 PC **A06**/MF **A01**
Centro de Desarrollo Industrial del Ecuador, Quito.
Technologia Simplificada de la Produccion del Cuero (Simplified Technology of the Production of Leather).
Jul 76, 103p
Text in Spanish. Sponsored in part by Agency for International Development, Washington, DC.

The study presents a technology of production of leathers by transforming and improving the technology of today. The curing of hides is studied extensively with consideration given to the different origins of the leather including diagrams explanatory of the chemical reactions and the most recommended reactives to be used.

PB80-170483 PC **A11**/MF **A01**
Netherlands Energy Research Foundation ECN, Petten.
Brazing Compilation of Literature References from 1973 to 1978.
J.C. Romer. Oct 79, 236p ECN-76

The report is a compilation of published literature on high temperature brazing covering the period 1973-1978. The references are listed alphabetically with regard to the base material or combination of base materials to be brazed. Trade names are treated as base materials. The report contains approximately 1500 references, of which 300 are to patents.

PB80-171002 PC **A05**/MF **A01**
Centro de Desarrollo Industrial del Ecuador, Quito.
Reporte Tecnico Sobre la Industrializacion Integral del Pseudo-Tallo de Banano (Technical Report on the Integral Industrialization of the Pseudo-Stem of Banana Trees).
May 79, 81p
Sponsored in part by Agency for International Development, Washington, DC. Text in Spanish.Color illustrations reproduced in black and white.

A description is given of the banana plant and areas where they are planted in Ecuador. Methods to utilize the banana fiber by mechanical processes for the production of textiles, ropes, boards, and possibly to obtain starches for nutritional purposes are presented. Additions to the document include photos, description of machinery, and a large bibliography.

PB80-174519 PC **A02**/MF **A01**
National Center for Productivity and Quality of Working Life, Washington, DC.
Machinery Manufacturer Improves Productivity Through Group Technology,
Thornton B. Moore. Feb 78, 17p

The study describes the experience of Molins Machine Co.'s Langston Division in converting its small parts plant from a job shop operation to Family Parts Line Production or Group Technology. Group Technology is the strategy of manufacturing parts similar in size and shape with different types of machine tools grouped physically together to accommodate a straight-through line flow. It especially benefits companies using batch type production in small lot sizes with a variety of parts and those using CAD/CAM. Conversion of Langston's machine shop layout and operations involved functional grouping of machine tools that perform similar processes/operations; preparation of loading schedules with jobs sequenced by run day/week; and transporting jobs from one work center to another in accordance with machine loading schedules.

SAND-79-1740 PC **A02**/MF **A01**
Sandia Labs., Albuquerque, NM.
Estimating Effective Isothermal Aging Temperature.
L. A. Harrah, and K. E. Mead. Jan 80, 10p
Contract EY-76-C-04-0789

Equivalent temperatures for isothermal aging to simulate fluctuating ambient temperatures are calculated where T(t) is temperature-time function for sinusoidally varying annual and diurnal cycles and delta E is an activation energy and the average is evaluated from mid-winter to mid-summer. The difference between the effective temperature, T/sub i/, and the mean temperature, for conditions approximating those of arid temperate climates, was found to be as high as 16 exp 0 celsius. For diffusion controlled reactions the temperature difference can be 7 to 10 exp 0 celsius. (ERA citation 05:013892)

UCID-18491 PC **A02**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Hard Surface Photomasks with Micron and Submicron Linewidths.
D. R. Ciarlo, and W. C. Herrmann. 18 Dec 79, 18p
Contract W-7405-ENG-48

The procedure used to fabricate photomasks for a Gallium Arsenide test chip with edge dimensions of 2.54 by 2.54 mm (100 by 100 mils) containing linewidths as small as 0.8 microns (31.5 mu in.) using equipment belonging to the Technical Photography Group, Rm. 1258, Bl[illegible], 121 is described. Gallium Arsenide Metal Schottky Field Effect Transistors (GaAs MESFET's) require photomasks with micron and submicron linewidths. In addition, the research and development status of this particular project makes it necessary to try out several design iterations in order to accumulate experimental data and verify theories. Each new design iteration requires a new set of photomasks. Commercial mask vendors are reluctant to work on linewidths below two microns at this time, although they will do so at a premium price ($4 K per set). Even if a commercial vendor agrees to make photomasks with one micron lines, the long delivery times encountered (several months) can seriously hurt the momentum of R and D projects. (ERA citation 05:010391)

13I. Machinery and Tools

AD-A082 444/1 PC **A02**/MF **A01**
Tribon Bearing Co Cleveland OH Maic Lab
Evaluation of New Materials for Rotor Hub Journal Bearings.
Final rept. Aug 76-Nov 77,
Donald W. Moyer. Feb 80, 22p USARTL-TR-78-39
Contract DAAJ02-76-C-0060

The nonlubricated bearing designs currently used in a number of helicopter rotor systems are based on a fabric-reinforced Teflon technology that is more than 10 years old. This test program was designed to evaluate some of the promising new self-lubricating materials and compare them to the present bearing design. These tests evaluated four new bearing materials plus two standard fabric-reinforced Teflon bearings. Tests were conducted at normal flight loads and motions initially. The bearing loads were then increased in order to accelerate material deterioration and to reduce the required test time. (Author)

AD-A082 882/2 PC **A02**/MF **A01**
ILC Dover Frederica DE Protective Equipment Div
Redesigned Pass-through Heat Seal Die.
Final rept. 11 Jun 79-29 Mar 80,
Charles R. Sandy. 28 Mar 80, 5p
Contract DAAK11-79-C-0066

This task was authorized to redesign the heat seal tool that attaches the air inlet to the DEP Outer garment. The original tool had permitted electrical arcing between the inlet fitting and itself during the heat seal operation. The new tool eliminates this arcing and continues to make a heat sealed seam of equal strength. (Author)

COO-2861-2 PC **A03**/MF **A01**
Loftus Furnace Co., Pittsburgh, PA.
Evaluation of Monobeam Test Program.
14 Mar 79, 32p
Contract EY-76-C-02-2861

The Monobeam is a mechanical device for transporting cold steel through a re-heating furnace for the purpose of bringing the cold steel up to a temperature where it can be hot worked through a rolling mill into strip or shapes. This is presently being done throughout the steel industry in pusher type furnaces and walking beam furnaces. The longitudinlly fired pusher furnace is less thermally efficient than the cross-fired walking beam furnace. The Monobeam furnace permits longitudinal firing, holds its insulation without maintenance during a furnace campaign, and was primarily invented as an energy-saving retrofit for existing pusher type furnaces. The program for testing and presenting an evaluation report for a prototype Monobeam unit at Armco's Middletown, Ohio, steel works is described. Test results are not included. This review concluded that the test program was professionally executed, and that data were properly recorded and analyzed. (ERA citation 05:013793)

MLM-2682 PC **A02**/MF **A01**
Mound Facility, Miamisburg, OH.
Crimping Machine for the Assembly of MC3347 and MC3352 Isolators.
A. V. Gress, Jr. 10 Jan 80, 12p
Contract EY-76-C-04-0053

A special lathe-type machine was designed and built to crimp the brass grounding cap to the steel spacer during the assembly of MC3347 and MC3352 isolators. The machine uses three rollers controlled by pneumatic and electronic circuitry to provide a semiautomatic cycle. All of the pressures and times associated with the operating parameters are adjustable and controllable. (ERA citation 05:010445)

N80-20591/7 PC **A03**/MF **A01**
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, OH.
Lubrication of Rolling-Element Bearings.
R. J. Parker. 1980, 26p NASA-TM-81449, E-370
Proposed for Presentation at Intern. Lubrication Conf., San Francisco, 18-21 Aug. 1980; Sponsored by Asme and the AM. Soc. Of Lubrication Engr.

The lubrication of rolling element bearings is surveyed. Emphasis is on the critical design aspects related to speed, temperature, and ambient pressure environment. Types of lubrication including grease, jets, mist, wick, and through the race are discussed. The historical development, present state of technology, and the future problems of rolling element bearing lubrication are discussed.

PAT-APPL-6-059 937 PC **A02**/MF **A01**
Department of the Army Washington DC
Clutch Employing Constant Force Springs.
Patent Application,
Erwin F'Geppert. Filed 23 Jul 79, 8p AD-D007 117/5
Portions of this document are not fully legible.
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A mechanical clutch comprising interposed clutch plates keyed to the input and output members for axial movement between driving positions frictionally engaged with one another and disengaged positions relaxed away from one another. The invention relates to the use of constant force, zero rate, springs for moving the clutch plates between the engaged and disengaged positions. (Author)

PAT-APPL-6-098 276 PC **A02**/MF **A01**
Department of the Navy Washington DC
Offset-Pad Bearing.
Patent Application,
Nathan T. Sides, and Thomas L. Daugherty. Filed 28 Nov 79, 14p AD-D007 137/3
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A bearing pad for slidably supporting a relatively movable load-applying member. The pad comprises a face member swingably mounted on a base member and having a bearing surface laterally offset toward the lending edge from the nadir of the base member and facing the movable member whereby the load normal to the bearing surface and frictional drag across the bearing surface both act to cause the face member to swing arcuately in the direction of movement of the moving member thereby tilting the bearing surface for trapping a wedged shaped film of lubricant between the bearing surface and the movable member. (Author)

PAT-APPL-6-121 076 PC **A02**/MF **A01**
Department of the Air Force Washington DC
Low Profile Precision Actuator.
Patent Application,
Ralph E. Rieben. Filed 13 Feb 80, 13p AD-D007 134/0
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

The present invention is concerned with providing a low profile precision actuator for installation within the wing of a scale model high performance aircraft. The actuator provides high output force with low input torque and an extremely high degree of precision movement in a confined space. The device includes a rhombus having an apex at one end attached to a fixed portion of the model with its opposite apex at the other end being attached to a moveable hinged aileron. The two side apexes of the rhombus are threaded, one having a right-hand thread and the other having a left-hand thread. Movement is accomplished by passing a threaded rod through each of the threaded side apexes of the rhombus and joining the inner ends of the rods with a coupling so that both rods and coupling rotate as a unit. The rotation of the unit causes the

side apexes to either separate or move closer together producing a corresponding substantially linear movement in the end apex which is attached to the moveable hinged aileron. Accordingly, it is an object of the invention to provide a low profile precision actuator suitable for installation in a scale model high performance aircraft to operate the control surfaces during wind tunnel design and development tests.

PAT-APPL-6-129 778 PC **A02**/MF **A01**
National Aeronautics and Space Administration. Hugh L. Dryden Flight Research Center, Edwards, CA.
Computer Circuit Card Puller.
Patent Application,
R. W. Sawyer, and B. Szwnalski. Filed 12 Mar 80, 11p N80-20589/1, NASA-CASE-FRC-11042-1
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A handtool for facilitating the removal of printed circuit cards is described. The device is adapted to sit on spaced, parallel rail surfaces of a card rack having a plurality of printed circuit cards. The device includes a cylindrical bar adapted to sit on the rail surfaces of the rack, a blade projected radially from the bar adapted to be received beneath a card rail, and a handle affixed to the bar in diametric opposition to the blade for facilitating manipulation of the blade for unplugging and lifting the card at its rail.

Y-2195 PC **A02**/MF **A01**
Oak Ridge Y-12 Plant, TN.
Linear-Motor Drives for Machine Tools.
W. E. Barkman. 31 Dec 79, 16p
Contract W-7405-ENG-26

Conventional techniques to position moving platforms on precision machines have relied heavily on mechanical drives such as the ball-nut/lead-screw system. Unfortunately, as positioning tolerances become more and more demanding, the cyclic errors-inherent even in precision gear drives-contribute an excessive amount of positioning uncertainty. The linear-motor drive system is one approach to provide a smooth, accurate, vibration-free method for locating a moving platform. Some existing uses of linear motors in industry as well as potential future applications on precision machines are discussed. (ERA citation 05:012273)

13J. Marine Engineering

AD-A082 504/2 PC **A02**/MF **A01**
David W Taylor Naval Ship Research and Development Center Annapolis MD
Superconductive D-C Ship Drive Systems,
T. J. Doyle. Jul 73, 18p

Superconductors are materials which exhibit zero electrical resistance at temperatures near absolute zero, supporting current densities in the order of 100,000 amperes per sq cm in the filamentary wire form. When wound into magnets helium cooled superconductors provide the compact, high flux source necessary for small, efficient electric machines. In ship drive applications, the use of high-power density superconductive generators and motors provide great flexibility of arrangement and of operation. These advantages are illustrated in advanced displacement and surface effect ship hulls with size and performance estimates based on NSRDC d-c machine developments. A recently completed acyclic machine, with a unique magnet-shield configuration designed to maximize flux utilization and power density, is described. The 51 cm (20 inch) diameter unit, now under evaluation, is expected to demonstrate more than 5000 hp per cubic meter at propulsion motor speeds. The machine includes a stationary, niobium titanium wire, solenoidal magnet surrounded by a 1010 steel magnetic shield. Rotor and stator copper drum conductors, series connected through liquid metal brushes, operate in the magnet/shield annulus.

AD-A082 530/7 PC **A03**/MF **A01**
Naval Academy Annapolis MD Div of Engineering and Weapons
Some Experimental Results with Ship Model Acceleration Waves,
S. M. Calisal. Feb 80, 44p Rept no. USNA-EW-4-80

The wave resistance of a ship moving at a constant speed can be calculated using information obtained from its wave pattern. One of the basic assumptions in wave survey methods is the existence of a time-independent model speed. In towing tanks initial acceleration is unavoidable. Wehausen (1964) showed that the effect of initial acceleration on wave resistance has a decaying and oscillating character. To study the validity of the theoretical results some experiments were performed. The variation of the measured spectra and the frequencies within the recorded total resistance pitching moment are of interest. Results indicate that models should travel a distance proportional to the square of the Froude number before wave data collection can be begun, that the predicted encounter frequency exists in the recorded total resistance and pitching moment signals, and that special effort is required to avoid initial acceleration waves due to wall effects.

AD-A082 739/4 PC **A04**/MF **A01**
Kaitz (Edward M) and Associates Inc Washington DC
Building Naval Vessels: A Handbook of Shipyard Costs.
Final rept. 1 Jun 79-31 Mar 80.
Mar 80, 51p Rept no. EMK-80-1
Contract N00014-79-C-0521

This study investigates and analyzes the shipyard cost of naval combatants, i.e., the costs of those elements of the total ship system for which the shipbuilder is responsible, namely, the costs to the shipbuilder of the construction and assembly of the platform. The analysis, confined to the cost of frigate-sized follow ships, focused on wage scales for production-line and non-production line workers; overhead costs, including supplemental labor costs and fringe benefits; and costs of materials used by the shipyard. The study examines shipyard costs during the 1965/1969 period with costs currently experienced by the shipyard. Based on this analysis, the increased cost at the shipyard of frigate-sized naval combatants can be explained by the following factors: (1) the general inflationary trend within the U.S. economy; (2) increased overhead costs; (3) general increases in capital and energy costs; (4) underutilization of the full capacity of specific segments of the shipbuilding industry; and (5) increased complexity of the modern naval combatant. (Author)

AD-A082 758/4 PC **A13**/MF **A01**
Teesside Polytechnic Middlesbrough (England) Dept of Mechanical Engineering
Relation between the Surface Friction of Plates and Their Statistical Microgeometry.
Interim rept. Apr 79-Jan 80,
M. J. King. Jan 80, 284p
Grant N00014-78-G-0059
Master's thesis.

An attempt is made to relate the geometry of nominally flat surfaces to their resistance to fluid flow. The experimental work was carried out in an open-flume, 20 metres in length, 30 cm wide, and 30 cm deep. The flow measurements were carried out over a range of free stream velocities from 35 cm/sec to 85 cm/sec. Hot film anemometry using a single sensor was used to measure the boundary layer velocity profile development along a 2.4 metre section of the channel floor which provides the base for the test surfaces. The velocity profiles are analysed to determine the surface friction coefficient using the simplified momentum integral equation as well as the logarithmic inner law approach. The test surfaces, including a 4.8 metre long replica of a ship hull surface, were examined using a number of surface measurement instruments capable of recording surface wavelengths from microns to metres. Surface profiles were recorded and digitised and the data statistically analysed to give an overall characterisation of the surfaces under investigation using both amplitude and spatial parameters. (Author)

AD-A082 823/6 PC **A07**/MF **A01**
Stanford Univ CA Dept of Civil Engineering
Finite Element Simulation of Simple Three-Dimensional Fully Cavitating Flows.
Final rept. 10 Oct 74-31 Dec 79,
Peter Y. Ko, and Robert L. Street. Nov 79, 126p Rept no. TR-241
Contract N00014-75-C-0277

Based on potential flow theory, a formulation is given for three-dimensional fully cavitating flow with a Riabouchinsky model. The model is nonlinear and the location of the free surface of the cavity is not known priori. Therefore, an iterative procedure is used to locate the free surface boundary. The employment of a trial-free-boundary approach effectively reduces the fully nonlinear model to a linear one, and the solution at each iteration is obtained by means of the finite element method (FEM). Examples studied were fully cavitating flow past flat plates in a water tunnel. Results are given for pure drag flows past circular and elliptic plates and a lifting flow past a circular plate. Because of the change in flow boundary conditions at the separation edge and the failure of the FEM to resolve these conditions accurately, the ability of the numerical solution to maintain a constant pressure over the entire cavity decreases as the three dimensionality of the free surface increases. However, the present procedure produces absolutely stable iterations and shows no sign of drifting of the free surface. It is found that satisfaction of a tangent separation condition of the free surface from the flat plate body is crucial for the stability of the iterative procedure. Grid refinement in both the streamwise and transverse directions reduces the computational error. While free surface movement between iterations is a useful convergence criterion, a flow-rate balance between upstream and downstream cross-sections appears not to be a good criterion.

AD-A082 843/4 PC **A03**/MF **A01**
David W Taylor Naval Ship Research and Development Center Bethesda MD Ship Performance Dept
Four Quadrant Open Water Characteristics of Controllable Pitch Propeller 4739 Designed for LSD-41 (Model 5367).
Final rept.,
Gary A. Hampton. Jan 80, 40p Rept no. DTNSRDC/SPD-0049-12

This report presents the results of an experimental program conducted to evaluate the open water thrust and torque on a controllable reversible pitch design propeller for the Dock Landing Ship (LSD-41). (Author)

PAT-APPL-6-096 708 PC **A02**/MF **A01**
Department of the Navy Washington DC
Buoy Anchoring System.
Patent Application,
Richard C. Swenson. Filed 21 Nov 79, 11p AD-D007 086/2
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A buoy anchoring system includes an anchor device in the form of a weighted cannister that pays out line from the center of a fixed, hollow-cored bale during free fall. The line is secured against further pay out after the device impacts the bottom by wrapping about a shaft that is driven upwardly within the bale by the impact. The shaft has a line engaging cross-bar at its upper end, and is held in an extended position prior to impact by a shear pin. (Author)

PAT-APPL-6-133 238 PC **A02**/MF **A01**
Department of the Navy Washington DC
Position Interlock System for Submarine Masts and Closure.
Patent Application,
Paul S. Catano, and Malvyn C. McDonald. Filed 24 Mar 80, 9p AD-D007 151/4
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A submarine's mast and its protective closure are prevented from inadvertently damaging each other while deploying or retrieving the mast and while securing the closure. Interconnected logic circuitry electronically prevents an improper actuation sequence so that the mast and closure do not collide. Mechanical linkages and fail-safes susceptible to corrosion and damage are eliminated thereby permitting more reliable operation from circuitry safely stowed inside the submarines. (Author)

13K. Pumps, Filters, Pipes, Fittings, Tubing and Valves

FE-2355-2(Rev.M) PC **A02**/MF **A01**
Consolidated Controls Corp., El Segundo, CA.
Coal Gasification Valves. Phase II. Quarterly Technical Progress Report.
C. Harper. Dec 79, 18p
Contract EX-76-C-01-2355

The inlet seat design on the Type I, II, and IV valves has been examined to determine the most expeditious means of eliminating the thermal cracking. Several designs are being evaluated for possible fabrication. Solid (one-piece) gates for both valve types were designed for fabrication from solid alumina ceramic. The one-piece design is slightly smaller than the composite design. Two gates of each type have been ordered. The gate designs were modified to utilize a large, flat wear tile to provide wear protection for the refractory. The Type III gate fabrication problems appear to be resolved. The one-piece alumina ceramic gates offer an additional fabrication method, if successful. (ERA citation 05:012921)

PAT-APPL-6-127 020 PC **A02**/MF **A01**
Department of the Navy Washington DC
Automatic Actuator for Variable Speed Pump. Patent Application,
Clark R. Hoffman. Filed 4 Mar 80, 12p AD-D007 076/3
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

In the instant invention, the control regulates the pump speed to deliver a maximum flow without full time attention by an operator. A rotary or linear actuator is used to change the pump speed to prevent unacceptably low pressures on the pump inlet or unacceptably high pressures on the pump outlet. Pressure operated switches at the inlet and outlet to the pump control the actuator to produce maximum flow rates through the pump. (Author)

13L. Safety Engineering

PB80-164775 PC **A04**/MF **A01**
Michigan Univ., Ann Arbor. Highway Safety Research Inst.
Analysis of Truck Accident and Exposure Information. Phase I Report.
Final rept. Jul 79-Mar 80,
James O'Day, Lyle Filkins, Kenneth Campbell, Arthur Wolfe, and Robert Scott. Nov 79, 57p UM-HSRI-79-89

The present status of information regarding accidents involving heavy trucks, particularly with regard to existing accident and exposure data sources, is reviewed. Plans and schedules are developed for the collection of additional accident and exposure data, both at the national level and at the state level. Analytical issues deserving special consideration are discussed briefly in general terms, and it is noted that these issues have considerable influence on the subsequent collection of new data. The case study and statistical inference approaches to determination of accident causation are also reviewed briefly and the latter is illustrated with examples involving heavy trucks.

PB80-167497 PC **A06**/MF **A01**
National Bureau of Standards, Washington, DC. National Engineering Lab.
A Study of Work Practices Employed to Protect Workers in Trenches,
Jimmie Hinze, and Nicholas J. Carino. Mar 80, 125p NBSIR-80-1988
Sponsored in part by Occupational Safety and Health Administration, Washington, DC.

Results of a field study of trenching practices, safety related problems in trenching, and the effect of the Occupational Health and Safety Administration (OSHA) regulations for excavation, trenching and shoring are presented. The data were gathered from over 100 interviews with contractors and foremen in various regions of the country and from the answers to questionnaires sent by contractors' associations to their membership. The data indicate: (1) the technical aspects of trenching work, (2) the industry's opinion of the current OSHA regulations, and (3) factors affecting safety performance in trenching work.

PB80-170525 PC **A03**/MF **A01**
National Bureau of Standards, Washington, DC. National Engineering Lab.
Recommended Guidelines for Safety Inspection of Construction of Concrete Cooling Towers,
H. S. Lew, S. G. Fattal, and B. J. Hunt. Feb 80, 37p NBSIR-80-1964
Sponsored in part by Occupational Safety and Health Administration, Washington, DC.

The guidelines furnished are based on existing OSHA regulations, but highlight their application to this type of construction by pointing out critical construction operations, their safety aspects, and needed compliance inspection procedures. Major regulatory provisions affecting the basic construction plans, safety aspects of design criteria and responsibilities, recordkeeping, and inspections are summarized. Special attention is given to construction loadings, construction sequences, hoisting systems, and personnel safety training. Detailed identification is made of items relating to concrete inspection, concrete control, formwork operations, construction loadings, hoisting systems, and construction safety planning.

13M. Structural Engineering

AD-A082 508/3 PC **A04**/MF **A01**
Scientific Service Inc Redwood City CA
An Empirical Study of Earth Covered Schools in Oklahoma.
Final rept.,
James V. Zaccor. Nov 79, 54p Rept no. SSI-7832-1
Contract DCPA01-78-C-0265

The present program was aimed at identifying what information is currently available to define broad trade-offs between earth covered and traditional schools, applying this information to provide an initial quantitative assessment of costs and benefits, and defining what additional studies and measurements might be desirable. Major areas to consider were: (1) Sociological, physiological, and psychological functional adequacy of earth covered schools, (2) Economic differences, their costs and benefits, (3) Practical aspects of disaster protection. The first task was to ensure earth covered structures were acceptable as a teaching and learning environment. The second task was to identify additional incentives (besides tornadoes) for building schools underground. The third task was to evaluate structural performance of Oklahoma's earth covered schools under realistic disaster loading conditions, as built, and to assess the degree to which this performance might be upgraded simply, to improve it. Two levels of upgrading were to be considered, options that could be implemented in a matter of hours on existing structures, and inexpensive options that could be introduced at the time of design to be incorporated during construction.

COO-10117-1 PC **A02**/MF **A01**
General Plastics Corp., Marion, IN.
Insulated Siding. Semi-Annual Technical Progress Report.
18 Dec 79, 8p
Contract FG02-79R510117

Progress in developing insulated panels as prefabricated siding for buildings is reported. The 2-ft wide panels contain Thermax insulation, vinyl facing, and vertical suspension members. Photographs and drawings are included. (ERA citation 05:013729)

PB80-166929 PC **A03**/MF **A01**
California Univ., Richmond. Earthquake Engineering Research Center.
On Response of Structures to Stationary Excitation,
Armen Der Kiureghian. Dec 79, 43p UCB/EERC-79/32, NSF/RA-790398
Grant NSF-ENG79-05906

Stationary responses of single- and multi-degree-of-freedom structures subjected to stationary input excitations are studied. Using a modal superposition procedure, closed form solutions for the first three spectral moments of response to white-noise and filtered white-noise inputs are derived. These solutions account for the correlation between modal responses of multi-degree structures; thus, they are applicable to structures with closely spaced modes. Special attention is given to excitations which are typical of earthquake ground motions. Various quantities of response can be obtained in terms of the three spectral moments. These include the mean squares of the response and its time derivative and, in the special case of Gaussian response, the mean zero-crossing rate and the mean, the variance, and the distribution of the peak response over a specified duration. In this regard, improved, semi-empirical relations for the mean and variance of the peak of a stationary Gaussian process are developed. Results from the study demonstrate the range of applicability of the white-noise model as an approximation for wide-band inputs.

PB80-166978 PC **A05**/MF **A01**
California Univ., Richmond. Earthquake Engineering Research Center.
Damageability in Existing Buildings,
T. Blejwas, and B. Bresler. Aug 79, 88p UCB/EERC-78/12, NSF/RA-780722
Grant NSF-ENV76-82384
Prepared in cooperation with Oklahoma State Univ., Stillwater. School of Mechanical and Aerospace Engineering.

Relative hazard is evaluated by a method based on the concept of damageability, where damageability is defined as the level of damage that would occur to a building if it were exposed to a single natural hazard or a series of such hazards. The procedure developed here comprises three evaluations. First, a structural response analysis is conducted; for seismic response analysis a variation on available elasto-plastic or piecewise-linear analyses is developed. The damageability of a structure is then defined as a function of intensity of exposure; for seismic damageability, generalized displacement, or base shear may be used as a measure of intensity. Local damageability indices, determined for elements throughout the structure, are combined to form a global damageability index, i.e., an index that represents the damageability of the structure as a whole. Finally, seismic damageability of the structure is related to potential earthquake demand by inelastic response spectra. The force-displacement relationship for the equivalent single-degree-of-freedom system assumed for the quasi-static response analysis is compared to inelastic force-displacement curves from inelastic response spectra. The level of response for this equivalent system that corresponds to the particular spectrum is estimated. A third damageability index, cumulative damageability, is defined as a measure of cumulative damage to a structure from previous loadings, such as earthquake or fire loads.

PB80-167091 PC **A05**/MF **A01**
California Univ., Richmond. Earthquake Engineering Research Center.
OPTDYN - A General Purpose Optimization Program for Problems with or without Dynamic Constraints,
M. A. Bhatti, E. Polak, and K. S. Pister. Jul 79, 92p UCB/EERC-79/16, NSF/RA-790396
Grant NSF-ENV76-04264

This report presents a general purpose optimization program for problems with or without dynamic (also called functional) constraints, such as those arising in the design of dynamically loaded structures and in designing controllers for linear multivariable systems using frequency response techniques. The program is based on an algorithm of the feasible directions type; a short description is included. It is written in Fortran IV language and runs on a CDC 6400 computer. Detailed description of logic of the main program and instructions for writing the user-supplied subroutines to define a particular problem are included. Three sample problems chosen from different fields are given to clarify the use of the program. Listings of the main program and user-supplied subroutines for two of the sample problems are given in the appendices.

PB80-167109 PC **A06**/MF **A01**
California Univ., Richmond. Earthquake Engineering Research Center.

Optimal Design of Localized Nonlinear Systems with Dual Performance Criteria Under Earthquake Excitations,
M. A. Bhatti. Jul 79, 110p UCB/EERC-79/15, NSF/RA-790395
Grant NSF-ENV76-04264

This report presents a formulation for earthquake-resistant design of localized nonlinear systems. Based upon the current design criteria, two levels of performance constraints are imposed as follows. For small earthquakes which occur frequently, the structure is constrained to remain elastic with no structural damage. For a large earthquake, the structure can undergo inelastic deformations at known locations of nonlinearities, with limited damage. The problem is formulated as a min-max problem, and a general strategy to transcribe it to the canonical form of a nonlinear programming problem is given. An algorithm of the feasible directions type is given to solve the resulting nonlinear programming problem. The general techniques are applied to the design of nonlinear energy-absorbing devices, which are part of an earthquake isolation system for many types of buildings. Several design problems with different performance criteria are considered and the results compared to see the effect of these different criteria. Comparison is also made with results reported earlier with only one level of constraints. The results clearly show the effectiveness of the present approach with dual performance criteria over the conventional single criterion approach.

PB80-167216 PC **A03**/MF **A01**
California Univ., Richmond. Earthquake Engineering Research Center.
Beam-Column Element 3D (Type 2-Parallel Element Theory) for the ANSR-II Program,
Ali Riahi, Graham H. Powell, and Digambar P. Mondkar. Dec 79, 35p UCB/EERC-79/31, NSF/RA-790363
Grant NSF-ENV76-04262

This report describes a three dimensional inelastic beam-column element developed for the ANSR-2 program. The report contains a description of the element characteristics, theoretical formulation, and a computer program user's guide.

PB80-167224 PC **A03**/MF **A01**
California Univ., Richmond. Earthquake Engineering Research Center.
Beam-Column Element 2D (Type 5-Parallel Element Theory) for the ANSR-II Program,
Dennis G. Row, Graham H. Powell, and Digambar P. Mondkar. Dec 79, 33p UCB/EERC-79/30, NSF/RA-790362
Grant NSF-ENV76-04262

This report describes a two-dimensional inelastic beam-column element developed for the ANSR-2 program. The report contains a description of the element characteristics and the computer program user's guide.

PB80-169709 PC **A02**/MF **A01**
California Univ., Richmond. Earthquake Engineering Research Center.
3D Truss Bar Element (Type 1) for the ANSR-II Program,
Digambar P. Mondkar, and Graham H. Powell. Nov 79, 18p UCB/EERC-79/29, NSF/RA-790361
Grant NSF-ENV76-04262

This report describes a three dimensional, inelastic, large displacement truss element developed for the ANSR-II program. The report contains a description of the element characteristics and a computer program user's guide.

PB80-169949 PC **A06**/MF **A01**
National Bureau of Standards, Washington, DC. National Engineering Lab.
BFIRES/Version 2: Documentation of Program Modifications,
Fred I. Stahl. Mar 80, 113p NBSIR-80-1982
See also report dated Mar 79, PB-295 063. Sponsored in part by Department of Health, Education, and Welfare, Washington, DC.

Sevural shortcomings of BFIRES/Version 1 are discussed. Chief among these are the program's inability to simulate rescue activities during fire events, and to simulate direct interactions between occupant behavior and toxic qualities of smoke filled environments. This report documents a revised program, BFIRES/Version 2, which contains new subroutines developed to mitigate these problems. These subroutines are grouped into two modules: (1) a 'smoke' module designed to simulate the experience of inhabiting a smoke filled environment, and (2) a 'rescue' module intended to permit the rescue of physically immobile occupants. Additional improvements incorporated into BFIRES/Version 2 include more efficient file management and data input facilities, and expanded output capabilities.

PB80-171085 PC **A06**/MF **A01**
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
Models of Threshold Exceedance and Loss Computations of Non-Homogeneous, Spatially Distributed Facilities. Seismic Design Decision Analysis Report No. 30,
Betsy Schumacker, and Robert V. Whitman. Mar 77, 125p R77-9, NSF/RA-770894
Grant NSF-GI-27955

Data and procedures are developed for balancing the increased cost of more resistant construction against the risk of losses during future earthquakes. Such information is relevant in considering measures for monitoring earthquake hazards which utilize knowledge of the probability that different thresholds of loss might be exceeded during any single earthquake. Different sets of probabilities are considered to establish the likelihood of prescribed threshold exceedance. Life safety, of course, is the paramount factor in deciding on measures for earthquake hazard mitigation, but building failures sometimes can be used as an indirect measure of potential for life loss. Life loss is conditional to building failure; and therefore, any model for threshold exceedance of life loss must also be a model for building failure. The report describes various loss thresholds which might be of interest together with a model developed for situations in which a two-state analysis is reasonable. Methods are described which are applicable for multi-state analysis. Applications of some of the methods are given for the areas of greater Boston and eastern Massachusetts.

PB80-171333 PC **A06**/MF **A01**
California Univ., San Diego, La Jolla. Dept. of Applied Mechanics and Engineering Sciences.
A Major Study of Concrete Masonry Under Seismic-Type Loading. Earthquake Response and Damage Prediction of Reinforced Concrete Masonry Multistory Buildings,
G. A. Hegemier, S. K. Arya, R. O. Nunn, M. E. Miller, and A. Anvar. Jan 78, 123p UCSD/AMES/TR-77/002, NSF/RA-780724
Grant NSF-ENV74-14818

A basis for a rational earthquake response and damage analysis of concrete masonry structures is developed. This effort defines material behavior and the behavior of typical connections used in concrete masonry structures. The analytical phase involves the translation of observed experimental data into viable mathematical models. The numerical effort concerns the conversion of mathematical models into numerical form and the construction of digital computer programs to simulate structural response and damage accumulation resulting from earthquake ground motion. The approach involves a sequence of increasingly complex levels of concurrent experimentation, analysis, and numerical simulation. The ability to extrapolate from conceptually simple laboratory-scale experiments to a wide variety of structural configurations, including simulation of full-scale building response to earthquake ground motion, is one of the most significant aspects of the project.

14. METHODS AND EQUIPMENT

14B. Laboratories, Test Facilities, and Test Equipment

AD-A082 430/0 PC **A03**/MF **A01**
Army Tropic Test Center APO Miami 34004
Methodology Investigation. Intensive Tropic Function Testing.
Final rept. Mar 76-Mar 77,
Eldon M. Cady, Jr., and Robert J. Gorak. Nov 78, 33p Rept no. USATTC-781103

USATTC conducted a methodology investigation in the humid tropics of the Canal Zone from March 1976 through March 1977. The objective was to determine whether intensive function testing or simulated tactical function testing can produce tropic-related effects similar to effects found after storage, while reducing the length of time typically required for tropic storage test designs. The US Army's 1.5-kilowatt AC generator was selected to evaluate three alternative test designs to determine whether one or more designs would accelerate tropic materiel defects and thereby shorten test time. The test designs were: intensive functioning, simulated tactical use and storage. The last is the prevailing design used by USATTC in tropic tests. RAM data were collected on five generators in each of the three design groups. It was concluded that: (1) The intensive functioning test design was less severe than either the storage or simulated tactical use test designs, (2) More valid RAM estimates can be obtained in the tropics when test designs incorporate expected field use patterns, (3) The generators of the storage test design exhibited no tropic storage-related effects; therefore, no conclusion could be drawn concerning the equivalence of the test designs in producing tropic storage-related effects. (Author)

AD-A082 619/8 PC **A03**/MF **A01**
Air Force Aero Propulsion Lab Wright-Patterson AFB OH
Rig Evaluation of the On-Line Ferrograph.
Final rept. 3 Jan-31 May 79,
P. W. Centers. Jan 80, 33p Rept no. AFAPL-TR-79-2100

An on-line ferrograph has been rig evaluated using the dynamic foam apparatus. The on-line ferrograph appears to be operational based upon determination of the effect of operational temperature and pressures. The unit has the required sensitivity as indicated by sample dilution and ferrous particulate additions to the system. Debris analysis using available techniques indicated little correlation among the methods; however, there was some correlation of the on-line device with the analytical ferrograph. With attention to minor operational limitations, engine evaluation of the on-line ferrograph should be pursued. (Author)

AD-A082 786/5 Not available NTIS
Eidgenoessisches Militaerdepartement Bern (Switzerland) Gruppe Fuer Ruestungsdienste
New Automatic Heat Flow Calorimeter,
R. Frauenfelder. 18 Jul 77, 6p
Availability: Pub. in Review of Scientific Instruments, v49 n4 p452-455 Apr 78 (No copies furnished by DTIC).

No abstract available.

AD-A082 792/3 Not available NTIS
Materials Research Labs Ascot Vale (Australia)
Microprocessor-Based Data-Acquisition Systems for Control of Laboratory Experiments,
H. A. Kellock, and W. G. Thege. 1977, 4p
Availability: Pub. in Proceedings of Conference on Microprocessor Systems, 15-16 Nov 77 p49-52 (No copies furnished by DTIC).

No abstract available.

AD-A082 958/0 PC **A04**/MF **A01**
Advisory Group for Aerospace Research and Development Neuilly-sur-Seine (France)
Comparative Measurements in Four European Wind Tunnels of the Unsteady Pressures on an Oscillating Model (The NORA Experiments),
N. Lambourne, R. Destuynder, K. Kienappel, and R. Ross. Feb 80, 52p Rept no. AGARD-R-673
Presented at the Structures and Materials Panel Meeting (49th), Porz-Wahn, Germany, Oct 79.

To obtain experience of the influence of tunnel wall interference on flutter and other unsteady tests in transonic wind tunnels, a programme of oscillatory pressure measurements was repeated in four tunnels: 3ft RAE Bedford, 1M DFVLR Gottingen, S2 ONERA Modane, and HST NLR Amsterdam.

These tunnels differ in the size of working section, their cross-section areas ranging from approximately 0.6 to 3.2 sq m; they also differ in the form of wall ventilation. In each tunnel, small amplitude harmonic oscillations were applied to the same rigid half-model of a low aspect ratio lifting surface, and chordwise distributions of the fundamental components of the oscillatory pressures were measured. Measurements were also made of the steady pressure distributions for the mean position about which the oscillations occurred. Some measurements were also made of the oscillatory pressures at a wall of each tunnel. Stream Mach number was varied between 0.60 and 1.10, and the mean steady incidence of the model from 0 to 5.5 deg. Tests were made for three frequencies of oscillation, the lowest, 5Hz, being regarded as a quasi-steady variation, the others, 40Hz and 60Hz, giving values of frequency parameter, based on mean chord, between 0.3 and 0.8 depending on Mach number. The results of the comparisons, whilst unable on their own to lead to rules regarding acceptable model-to-tunnel size ratios, tend to confirm current procedure. They do, however, draw attention to a possible defect in the practice of mounting a half-model at a tunnel wall that is itself ventilated.

AD-A083 019/0 PC **A02**/MF **A01**
Wentworth Inst Boston MA
Design and Fabrication of Quadrupole Ion Mass Spectrometer for Upper Atmosphere.
Scientific rept. no. 1. 1 Oct 77-30 Sept 78,
M. McDonald. Dec 79, 13p AFGL-TR-80-0024
Contract F19628-78-C-0017

The cluster ion mass spectrometer consists of a two piece cone section with the top cone section electrically biased with respect to the lower cone. The front cone has an orifice opening of .03-.04 in. diameter for ion sampling. The cone assembly was attached to a liquid helium cooled cryo pump supplied by another contractor. Attached to the bottom side of the liquid helium cryo pump is the base plate, 'O' rings provided the vacuum seal between the base plate and cryo pump. Rod housing was fixed to the base plate and extended upward through the pump section. A RF quadrupole assembly extended to the upper region of the front cone sampling area and downward to an ion detecting electronic multiplier. An aluminum ring was externally attached to the base plate to support the electronics section of the instrument. This section consisted of a series of leg supports to which was attached a deck plate to hold an electronics oscillator box and an assortment of other housekeeping equipment. Below this deck and mechanically to it is a complex cast aluminum housing of electronic equipment. This entire section was enclosed with a vacuum tight electronic cover can.

AD-A083 022/4 PC **A02**/MF **A01**
Wentworth Inst Boston MA
Design and Fabrication of Quadrupole Ion Mass Spectrometer for Upper Atmosphere.
Rept. for Oct 78-Aug 79,
M. McDonald. Dec 79, 11p SCIENTIFIC-2, AFGL-TR-80-0025
Contract F19628-78-C-0017

The material contained in this report describes in a quasi-historical format the design and fabrication of component parts and assemblies used in an Upper Atmosphere Composition Research Program conducted by the Composition Branch of the Aeronomy Laboratory, for AFGL. (Author)

DOE/ER/10393-1 PC **A03**/MF **A01**
Colorado School of Mines, Golden.
Improved Instrument for the Measurement of the Thermal Conductivity of Non-Electrolyte Liquids. Progress Report No. 1, May 1, 1979-January 15, 1980.
E. D. Sloan, and M. S. Graboski. 1980, 27p
Contract AC02-79ER10393

An improved instrument for the measurement of the thermal conductivity of non-electrolyte liquids was designed and constructed. Eventually the apparatus will be tested and the thermal conductivity of two coal-derived synthetic oils will be measured. (ERA citation 05:014123)

EPRI-NP-1212 PC **A04**/MF **A01**
California Univ., Berkeley. Lawrence Berkeley Lab.
Measurement of the Thickness of Liquid Film by Means of Capacitance Method. Interim Report.
B. Leskovar. Nov 79, 68p
Contract W-7405-ENG-48

A technique was developed for measuring water film thickness in a two phase annular flow system by means of the capacitance method. Theoretical considerations are applied to estimate the capacitance value as a function of the film thickness. An experimental model of the flow system with two types of electrodes mounted on the inner wall of a cylindrical tube was constructed and evaluated. The ability of the apparatus to observe fluctuations and wave motions of the water film passing over the electrodes is described. (ERA citation 05:012382)

INIS-mf-4518 PC **A03**/MF **A01**
Acos Finos Piratini S.A., Porto Alegre (Brazil).
Installation of an Automatic X-Ray Spectrachemical Laboratory.
R. A. Villanova, and D. F. Sermin. 40p CONF-740788-3
In Portuguese, English.Annual congress of the Brazilian Association of Metals, Porto Alegre, Rio Grande do Sul, Brazil, 7 Jul 1974.
U.S. Sales Only.

Several steps necessary to install an X-ray spectrometer automation system for steels and raw material analysis, are discussed. Equipment description, analytical programme, calibration, tests and other subjects regarding personnel training, technical assistance and maintenance, are included. A perfect adjustment of the choosen equipment, in so far as it cocerns the technical performance and operation costs, is also dotained. A condensed translation in English of the principals chapters is presented at the end of the work. (Atomindex citation 09:415037)

LA-UR-79-3238 PC **A03**/MF **A01**
Los Alamos Scientific Lab., NM.
Top down Viewing of the Inductively Coupled Plasma Using a Dual Grating, Direct Reading Spectrograph and an All Mirror Optical System.
C. T. Apel, D. V. Duchane, and B. A. Palmer.
1980, 47p CONF-800110-1
Contract W-7405-ENG-36
International conference on developments in atomic plasma spectrochemical analyses, San Juan, Puerto Rico, 7 Jan 1980.

Using an all-mirror optical system, an inductively coupled plasma is viewed top down and the light is directed to a dual grating, direct reading spectrograph. Top down viewing of the plasma, with masking of the image of the argon plasma torus at the spectrograph entrance slit, significantly reduces background signal from the source and permits the use of the depth of field of the optical system to achieve compromise conditions for viewing the plasma. Light from the plasma source is introduced to the optical system by means of a mirror situated directly over the plasma. The system is exhausted in such a way that cool air flowing past the mirror forms a thermal barrier between the mirror and the plasma. Elements such as copper and lead have atomic and ionic lines which tend to exhibit self absorption when viewed top down through the cooler ground state atoms in the plume of the plasma. One of the approaches to this problem is to shear off the plume of the plasma with a jet of air directed across the tip of the plasma. A second approach is to make use of the dual grating, direct reading spectrograph and real-time computer system which easily permits the setting of alternate lines for each element so that self absorption and matrix effects are minimized. The design of the dual-grating, direct-reading spectrograph allows for the mounting of more than 200 13-mm-dia photomultiplier tubes along the focal curves. In an effort to demonstrate the use of fiber optics as a viable technique for the closer placement of exit slits, a red sensitive photomultiplier tube was coupled with a 30-cm fiber-optic ribbon to detect light from the Li 670.784 nm line on the focal curve. It was successful and had the added advantages of absorbing second-order ultraviolet light. (ERA citation 05:012220)

LA-7979-PR PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
Development of a Sampling and Analytical Method for Styrene Oxide, November 1, 1978-March 31, 1979.
J. F. Stampfer, R. E. Hermes, R. W. Weeks, Jr., E. E. Campbell, and H. J. Ettinger. Dec 79, 16p
Contract W-7405-ENG-36

A method is described for the collection and analysis of airborne styrene oxide. The sampler consists of a tube holding a glass fiber filter followed by a sorbent, Tenax-GC. The styrene oxide is extracted from the sampler with ethyl acetate and an aliquot analyzed by gas-liquid chromatography. Recoveries of > 95% were obtained with samples (0.5 to 44 mu g) collected from 80% relative humidity test atmospheres. The coefficient of variation for the method, including an assumed pump error of +-5%, was 0.076. The limit of detection of the analytical method was 0.1 mu g per sample. Stability and interference studies indicate the method to be suitable for personal monitoring. (ERA citation 05:012424)

LBL-7293 PC **A03**/MF **A01**
California Univ., Berkeley. Lawrence Berkeley Lab.
Microwave Spectrometer for the Detection of Transient Gaseous Species.
W. F. Kolbe, W. D. Zoellner, and B. Leskovar.
Jun 79, 30p
Contract W-7405-ENG-48

A microwave spectrometer and associated apparatus for the detectin of unstable free radical species is described. The spectrometer, which operates over a frequency range from 66 to 73 GHz, consists of a tunable Fabry-Perot resonator followed by superhetrodyne detection for high sensitivity at low power levels. The resonator tuning is accomplished by means of a computer controlled stepping motor and by a piezoelectric transducer which also permits the use of source modulation and phase sensitive detection at 100 Hz. The sensitivity of the spectrometer is adequate to permit the detection of rotational transitions with absorption coefficients as small as 2 x 10 exp -9 cm exp -1 . The operation of the spectrometer is demonstrated by the detection of the two free radical species OH and SO. In the case of OH, a number of lambda -doubling transitions, previously unobserved, are reported. (ERA citation 05:012383)

N80-20285/6 PC **A04**/MF **A01**
Old Dominion Univ. Research Foundation, Norfolk, VA.
Scale Model Studies for Establishing the Flow Patterns of a Low-Speed Tunnel.
Progress Report, 15 Mar. - 14 Sep. 1979.
P. S. Barna. Mar 80, 73p NASA-CR-159234
Grant NSG-1563

Experiments were conducted in a model tunnel scaled down in a ratio of 1:24 from the full size prototype V/STOL tunnel at NASA Langley Research Center. The flow characteristics around the tunnel were studied and the location and causes of local flow separation and local recirculation were documented. The study of the interaction between the various components from which the tunnel is built, an experimental setup similar to the sequence of tunnel circuit components was constructed which enabled the various components to be tested either individually or in combination. The components were tested by the simple technique of blowing air through them, then measuring the velocity distribution at relevant sections.

N80-20286/4 PC **A14**/MF **A01**
National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
Real-Time Data Reduction Capabilities at the Langley 7 by 10 Foot High Speed Tunnel.
C. H. Fox, Jr. Jan 80, 317p NASA-TM-78801

The 7 by 10 foot high speed tunnel performs a wide range of tests employing a variety of model installation methods. To support the reduction of static data from this facility, a generalized wind tunnel data reduction program had been developed for use on the Langley central computer complex. The capabilities of a version of this generalized program adapted for real time use on a dedicated on-site computer are discussed. The input specifications, instructions for the console operator, and full descriptions of the algorithms are included.

N80-20564/4 PC **A03**/MF **A01**
National Aeronautics and Space Administration. Wallops Flight Center, Wallops Island, VA.
An Initial Assessment of the Performance Achieved by the Seasat-1 Radar Altimeter.
W. F. Townsend. Feb 80, 41p NASA-TM-73279

The results of an initial on-orbit engineering assessment of the performance achieved by the radar altimeter system flown on SEASAT-1 are presented. Additionally, the general design characteristics of this system are discussed and illustrations of altimeter data product are provided. The instrument consists of a 13.5 GHz monostatic radar system that tracks in range only using a one meter parabolic antenna pointed at the satellite nadir. Two of its unique features are a linear FM transmitter with 320 MHz bandwidth which yields a 3.125 nanosecond time delay resolution, and microprocessor implemented closed loop range tracking, automatic gain control (AGC), and real time estimation of significant wave height (SWH). Results presented show that the altimeter generally performed in accordance with its orginal performance requirments of measuring altitude to a precision of less the 10 cm RMS, significant wave height to an accuracy of + or - 0.5 m or 10%, whichever is greater, and ocean backscatter coefficient to an accuracy of + or - 1 db, all over an SWH range of 1 to 20 meters.

N80-21202/0 PC **A05**/MF **A01**
Cleveland State Univ., OH.
Error Analysis in the Measurement of Average Power with Application to Switching Controllers.
Contractor Report, Oct. 1978 - Oct. 1979.
J. E. Maisel. Mar 80, 84p NASA-CR-159792, DOE/NASA/3222-80/1
Contract EC-77-A-31-1044
Sponsored by NASA.

Power measurement errors due to the bandwidth of a power meter and the sampling of the input voltage and current of a power meter were investigated assuming sinusoidal excitation and periodic signals generated by a model of a simple chopper system. Errors incurred in measuring power using a microcomputer with limited data storage were also considered. The behavior of the power measurement error due to the frequency responses of first order transfer functions between the input sinusoidal voltage, input sinusoidal current, and the signal multiplier was studied. Results indicate that this power measurement error can be minimized if the frequency responses of the first order transfer functions are identical. The power error analysis was extended to include the power measurement error for a model of a simple chopper system with a power source and an ideal shunt motor acting as an electrical load for the chopper. The behavior of the power measurement error was determined as a function of the chopper's duty cycle and back EMF of the shunt motor. Results indicate that the error is large when the duty cycle or back EMF is small. Theoretical and experimental results indicate that the power measurement error due to sampling of sinusoidal voltages and currents becomes excessively large when the number of observation periods approaches one-half the size of the microcomputer data memory allocated to the storage of either the input sinusoidal voltage or current.

ORNL/TM-5456 PC **A05**/MF **A01**
Oak Ridge National Lab., TN.
Laboratory Services Series: A Programmed Maintenance System.
D. C. Tuxbury, and B. E. Srite. Jan 80, 83p
Contract W-7405-ENG-26

The diverse facilities, operations and equipment at a major national research and development laboratory require a systematic, analytical approach to operating equipment maintenance. A computer-scheduled preventive maintenance program is described including program development, equipment identification, maintenance and inspection instructions, scheduling, personnel, and equipment history. (ERA citation 05:014012)

PAT-APPL-6-003 558 PC **A02**/MF **A01**
Department of Energy, Washington, DC.
Side-Welded Fast Response Sheathed Thermocouple.
Patent Application,
K. R. Carr. Filed 15 Jan 79, 5p
Contract W-7405-ENG-26
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A method of fabricating the measuring junction of a grounded-junction sheathed thermocouple to obtain fast time response and good thermal cycling performance is provided. Slots are tooled or machined into the sheath wall at the measuring junction, the thermocouple wires are laser-welded into the slots. A thin metal closure cap is then laser-welded over the end of the sheath. Compared to a conventional grounded-junction thermocouple, the response time is 4 to 5 times faster and the thermal shock and cycling capabilities are substantially improved. (ERA citation 05:019268)

PAT-APPL-6-005 263 PC **A02**/MF **A01**
Department of Energy, Washington, DC.
Improved Gas Mixtures for Gas-Filled Particle Detectors.
Patent Application,
L. G. Christophorou, D. L. McCorkle, D. V. Maxey, and J. G. Carter. Filed 22 Jan 79, 7p
Contract W-7405-ENG-26
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

Improved binary and tertiary gas mixture for gas-filled particle detectors are provided. The components are chosen on the basis of the principle that the first component is one gas or mixture of two gases having a large electron scattering cross section at energies of about 0.5 eV and higher, and the second component is a gas (Ar) having a very small cross section at and below about 0.5 eV; whereby fast electrons in the gaseous mixture are slowed into the energy range of about 0.5 eV where the cross section for the mixture is small and hence the electron mean free path is large. The reduction in both the cross section and the electron energy results in an increase in the drift velocity of the electrons in the gas mixtures over that for the separate components for a range of E/P (pressure-reduced electron field) values. Several gas mixtures are provided that provide faster response in gas-filled detectors for convenient E/P ranges as compared with conventional gas mixtures. (ERA citation 05:019258)

PAT-APPL-6-101 965 PC **A02**/MF **A01**
Department of the Navy Washington DC
Flexible Linear Thermal Array.
Patent Application,
Richard C. Swenson. Filed 10 Dec 79, 10p AD-D007 085/4
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A flexible cable type of linear thermal array is constructed of a bundle of insulated conductor pairs enclosed in a braided aramid fiber strength layer through which individual pairs are withdrawn at intended thermister stations and the end portions thereof loosely caged in the lumens of thermoplastic tubes. After an outer layer of thermoplastic fiber is braided over the bundle and tubes openings are formed through the outer layer and tubes, the wire end portions withdrawn, thermistors connected thereto and reinserted in the tube lumens. (Author)

PAT-APPL-6-104 983 PC **A02**/MF **A01**
Department of Health, Education, and Welfare, Washington, DC.
High Resolution Electron Microscope Cold Stage.
Patent Application,
Steven B. Hayward. Filed 4 Mar 80, 11p PB80-168511
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

This invention relates to electron microscopes, and, more particularly, to an improved cold stage for an electron microscope, said cold stage being specifically designed to reduce relative motion between the sample holder and the objective lens.

PAT-APPL-6-126 268 PC **A02**/MF **A01**
Department of the Navy Washington DC
Application on Ion Implantation to LiNbO3 Integrated, Optical Spectrum Analyzers.
Patent Application,
William K. Burns, and Thomas G. Giallorenzi.
Filed 3 Mar 80, 9p AD-D007 146/4
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

This document discloses a method of improving the signal-to-noise ratio (dynamic range) in integrated optical spectrum analyzers. An integrated optical spectrum analyzer is formed with a lithium niobate (LiNbO3) substrate in its usual manner. Ions such as argon or hydrogen are implanted in the bottom and sides of the LiNbO3 which causes the substrate to absorb light at the wavelength of interest. The ion-implanted bottom and sides provide absorption with very little reflectivity and the amount of absorption is proportional to the effect of the ion and the time period of implantation. The bottom and sides behave as optical sinks, rather than as reflection or scattering centers. (Author)

PAT-APPL-6-126 589 PC **A03**/MF **A01**
Department of the Navy Washington DC
Towed Array Condition Appraisal System.
Patent Application,
George O. Pickens. Filed 3 Mar 80, 32p AD-D007 078/9
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A device is structured to pass along a towed array of hydrophones, from the forward end thereof to the rearward end thereof. The device carries a small acoustic projector to project test signals to respective hydrophones as the device passes them by. The responses of respective individual hydrophones to the test signals are recorded to enable calibration of the array in situ, and additionally, or alternatively, are recorded to determine the departure of the array from the ideal straight, (generally) horizontal line. (Author)

PAT-APPL-6-127 707 PC **A02**/MF **A01**
Department of the Navy Washington DC
Direct Reading Capacitance Meter.
Patent Application,
Clifford O. Shaw. Filed 6 Mar 80, 17p AD-D007 075/5
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

This invention relates to an apparatus for measuring capacitance, especially large capacitance. The resulting measurement is displayed on a meter calibrated in capacitance. One method of determining the capacitance of a large, unknown capacitor is to charge it to a predetermined DC voltage, then discharge it through a known resistor and an SCR while observing the discharge wave form on an oscilloscope. Another method is to insert the unknown capacitor in a bridge circuit in which fixed capacitors and, in some cases, other circuit elements are provided. The present invention obviates the above mentioned prior art by providing a direct reading capacitance meter for measuring a wide range of capacitances. The invention has circuits for a voltage comparator and logic trigger, a flip-flop multi-vibrator, and a ramp generator. The output voltage of the ramp generator is determined by the duration interval of the input pulse, and produces a reading on a meter which is calibrated in three ranges of capacitance to provide the user with a direct reading capacitance meter.

PAT-APPL-6-128 229 PC **A02**/MF**A01**E
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.
Inorganic Spark Chamber Frame and Method of Making the Same.
Patent Application,
T. M. Heslin. Filed 7 Mar 80, 22p N80-20565/1, NASA-CASE-GSC-12354-1
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A spark chamber frame includes a number of beams formed from an inorganic materials such as cermic or glass which are connected together with

an inorganic bonding material having substantially the same thermal expansion as the beam material. A number of wires also formed from an inorganic composition are positioned between opposed beams so that wires are uniformly spaced and form a grid. Four hold-down straps, also formed of ceramic or glass and having substantially the same chemical and thermal properites as the beam material, overlie the wires and are bonded to the beams.

PAT-APPL-6-129 858 PC **A02**/MF **A01**
Department of the Air Force Washington DC
Biaxial Shear Force Gauge.
Patent Application,
Clarence J. Harris. Filed 13 Mar 80, 14p AD-D007 127/4
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

This invention pertains to a gauge for use with a test specimen that is madeof a preselected ablative material to be tested, and that is in a high temperature gaseous flow (i.e., a hot environment) which is capable of ablating the test specimen, and which also is capable of inducing, and of exerting on the test specimen, a resultant shear force (i.e,. a shear force vector) that comprises constituent axial and lateral forces. The test specimen is bonded on the mounting surface of a block member (of the guage) that is positioned on bearings, within a housing, for movement in axial and lateral directions. A plurality of force sensors are positioned around the perimeter of the block member, and the constituent axial and lateral forces of the resultant shear force that is acting on the tests specimen are transmitted to these sensors. The components of the guage are protected from shock by their structure and positional relationship, and are protected from overheating by the water-cooling of the housing. Unlike the prior art, the gauge also can be used in a cold, rather than a hot, environment. (Author)

PAT-APPL-6-135 370 PC **A02**/MF **A01**
Department of Transportation, Washington, DC.
Combination Absolute and Differential Temperature System.
Patent Application,
William A. Davidson. Filed 31 Mar 80, 17p PB80-167141
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

The measurement of small differential temperatures over a wide range of absolute temperatures is accomplished by cyclically switching the excitation polarity to a bridge circuit including the temperature sensors. Additionally, the measuring circuitry includes a differential-differential amplifier configuration and a pair of compensating conductors in the cable to each sensor to achieve equal resistance in each excitation path.

PAT-APPL-957 632 PC **A02**/MF **A01**
Department of Energy, Washington, DC.
Apparatus for Measuring Resistance Change Only in a Cell Analyzer and Method for Calibrating It.
Patent Application,
R. A. Hoffman. Filed 3 Nov 78, 6p
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

The disclosure relates to resistance only monitoring and calibration in an electrical cell analyzer. Sample and sheath fluid flows of different salinities are utilized, the sample flow being diameter modulated to produce a selected pattern which is compared to the resistance measured across the flows. (ERA citation 05:019580)

PATENT-4 137 757
Not available NTIS
Department of the Army Washington DC
Compression Testing Apparatus.
Patent,
Austin Kovacs. Filed 2 Feb 78, patented 6 Feb 79, 5p AD-D007 090/4, PAT-APPL-874 442
Supersedes PAT-APPL-874 442-78.
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

A testing apparatus comprising two platens, one of which is a self-aligning specimen contacting platen which includes an upper portion comprising a first member which contacts the specimen and a second member which is spaced from a bas e by a plurality of balls. The first and second members are movable relative to each other to pivot the specimen into proper alignment between the platens when the specimen is subjected to compression. The plurality of balls are juxtaposed between and engage the second member of the upper portion and the base and serve to support the upper portion for lateral and rotational movement relative to the base to facilitate alignment. (Author)

PATENT-4 162 509
Not available NTIS
Department of the Army Washington DC
Non-Contact Velocimeter Using Arrays.
Patent,
Kenneth D. Robertson. Filed 21 Jun 78, patented 24 Jul 79, 5p AD-D007 092/0, PAT-APPL-917 754
Supersedes PAT-APPL-917 754-78.
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

Apparatus for measuring velocity is disclosed. The apparatus in its preferred embodiment comprises a first lens and a first array of photodiodes and a second lens and a second array of photodiodes. The photodiode arrays are functionally equivalent to low resolution vidcon camera tubes and momentarily store the image. As an object passes beneath the first lens, its image is stored on the photodiode array. The object then passes beneath the second array and the image is stored on the second array. After the image is stored on the second array a correlation is made between the two images by making an element by element comparison of the serial outputs of the two arrays. Instead of relying on the storage properties of the arrays to make the correlation. The arrays can be read into a small memory for comparison. Each array is exposed for only a short period of time. The invention includes apparatus for controlling the time interval between the exposures. If correlation is not achieved, the time interval between exposures is adjusted until correlation is achieved. When correlation is achieved, the velocity is obtained by dividing the distance between the arrays by the time interval between the exposures of the two arrays. (Author)

PATENT-4 193 693
Not available NTIS
National Aeronautics and Space Administration. Pasadena Office, CA.
Velocity Servo for Continuous Scan Fourier Interference Spectrometer.
Patent,
R. A. Schindler. Filed 24 Feb 78, patented 18 Mar 80, 6p N80-20563/6, PAT-APPL-880 729 NASA-CASE-NPO-14093-1
Supersedes PAT-APPL-880 729-78, N78-22891 (16 - 13, p 1778). Sponsored by NASA.
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC. 20231 $0.50.

A velocity servo for continuous scan Fourier interference spectrometer of the double pass retroreflector type having two cat's eye retroreflectors is described. The servo uses an open loop, lead screw drive system for one retroreflector with compensation for any variations in speed of drive of the lead screw provided by sensing any variation in the rate of reference laser fringes, and producing an error signal from such variation used to compensate by energizing a moving coil actuator for the other retroreflector optical path, and energizing (through a highpass filter) piezoelectric actuators for the secondary mirrors of the retroreflectors.

PATENT-4 195 279
Not available NTIS
National Aeronautics and Space Administration. Hugh L. Dryden Flight Research Center, Edwards, CA.
Attaching of Strain Gages to Substrates.
Patent,
M. M. Lemcoe, and H. E. Pattee. Filed 16 Feb 78, patented 25 Mar 80, 4p N80-20560/2, PAT-APPL-878 539 NASA-CASE-FRC-10093-1
Supersedes PAT-APPL-878 539-78, N78-18393 (16 - 09, p 1160). Sponsored by NASA.
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC. 20231 $0.50.

A method and apparatus for attaching strain gages to substrates is described. A strain gage having a backing plate is attached to a substrate by using a foil of brazing material between the backing plate and substrate. A pair of electrodes that are connected to a current source, are applied to opposite sides of the backing plate, so that heating of the structure occurs primarily along the relatively highly conductive foil of brazing material. Field installations are facilitated by utilizing a backing plate with wings extending at an upward incline from either side of the backing plate, by attaching the electrodes to the wings to perform the brazing operation, and by breaking off the wings after the brazing is completed.

PATENT-4 199 759
Not available NTIS
Department of the Air Force Washington DC
System for Correlating Electronic Distance Measurement and Aerial Photography for the Extension of Geodetic Control.
Patent,
Donald I. Zulch, and Robert Brock. Filed 10 Aug 78, patented 22 Apr 80, 5p AD-D007 161/3, PAT-APPL-932 813
Supersedes PAT-APPL-932 813-78.
Availability: This Government-owned invention available for U.S. licensing and, ppossibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

The invention is a system designed to combine in a unique manner, precision timing, precision photogrammetric resection, radar mapping and electronic distance measurement to extend accurate geodetic control. This system enables a common grid coordinate system to move without the delay normally attendant for accurate location of electronic guidance beacons and distance measuring equipment (DME)grid beacons. There now exists four airborne real time sensor systems that utilize precision distance measurement to locate their present position and the position of the targets indicated by the sensors, in a geodetic coordinate system. These systems are active high resolution mapping and surveillance radar and precise direction finding systems to survey large areas. The systems are tied by electronic distance measuring to geodetic ground control previously surveyed. The invention utilizes a low flying aircraft whose course and location is precisely known. The aircraft, known as an electronic location station (ELS), is photographed as it flys over the unknown area by either an aircraft or satellite. The precision location information is combined with a series of photos in a photogrammetric process thereby extending geodetic control into the unknown area.

PB80-166267 PC **A15**/MF **A01**
National Bureau of Standards, Washington, DC. Office of International Relations.
Standardization and Measurement Services in Indonesia.
Final rept.,
H. Steffen Peiser, Noel J. Raufaste, Raymond C. Sangster, Benjamin M. Gutterman, and Penelope M. Odar. Sep 79, 350p NBSIR-78-1583
Grant PASA-TA(CE)-6-71

At the request of the Indonesian State Minister for Research and Technology, the National Bureau of Standards conducted a two-week survey of standardization and measurement systems in support of industrialization. There were six topics of specialization: (1) Food and Food Safety, (2) Building and Construction, (3) Quality Control in Industry, (4) Safety Standards, (5) Calibration, Instrumentation, and Metrology, and (6) Industrial Measurement Techniques. In the executive summary the appraisal of the existing systems for standardization and measurement is coupled with recommendations. A background section is followed by one with

the Indonesian specialists' assessments of needs and opportunities.

PB80-167471 PC **A07**/MF **A01**
National Telecommunications and Information Administration, Boulder, CO. Inst. for Telecommunication Sciences.
Propagation Effects on an Intervisibility Measurement System Operating in the SHF Band.
Technical rept.,
E. J. Haakinson, E. J. Violette, and G. A. Hufford. Feb 80, 138p NTIA/REPORT-80/35
Sponsored in part by Army Combat Developments Experimentation Command, Fort Ord, CA.

A study was conducted to determine the limiting propagation effects on the performance of a microwave system that could be used to detect the optical visibility to one another of two vehicles, separated by up to 10 km, in irregular, obstructed terrain. The study had four objectives: (1) to demonstrate what effects signal variability has on the intervisibility decision process, (2) to identify the possible sources of the signal variability and to estimate the magnitude of each source's contribution to the total variability, (3) to obtain propagation loss data, over various types of terrain and obstructed paths, which could be used to predict received signal variability due to propagation over similar paths, and (4) to use the measured data to determine the performance of simulated intervisibility measurement system. A measurement system was prepared and sent to Ft. Hunter Liggett, CA, where propagation path loss was measured over several selected paths of varying lengths, varying path geometrics, and varying amounts of vegetation and rock outcroppings.

PB80-169527 PC **A03**/MF **A01**
National Bureau of Standards. Washington, DC.
Dimensions/NBS. Volume 64, Number 1, February 1980.
Monthly rept.
Feb 80, 29p NBS/DIM-64/1
See also Volume 63, Number 12, PB80-130701.

This monthly magazine features short summaries of major technical developments, highlights of work in progress, major speeches and statements by Bureau management, and a listing of NBS publications. The table of contents for the current issue is: Equity Beyond the Marketplace, D. Johnson; Energy Forecasting: Improving on the Crystal Ball, M. Baum; In the Pursuit of Precision, M. Baum; NBS Measurement Seminars, M. Baum; Gas SRM's for Emissions Testing of Heavy Duty Vehicles, G. Porter; Eddy Current Imaging System, B. Field; Economical and Accurate Method for Calculation of Atomic Properties, S. Younger; Resolution of Photon-Recoil Components of Visible Spectral Line, R. Barger; Conferences, Publications, News briefs.

PB80-169535 PC **A03**/MF **A01**
National Bureau of Standards, Washington, DC.
Dimensions/NBS. Volume 64, Number 2, March 1980.
Monthly rept.
Mar 80, 40p NBS/DIM-64/2
See also Volume 64, Number 1, PB80-169527.

This monthly magazine features short summaries of major technical developments, highlights of work in progress, major speeches and statements by Bureau management, and a listing of NBS publications. The table of contents for the current issue is: Signs of the Times, L. Chen and B. Plocinik; Measurement and Industrial Development in the 1980's, T. Dillon; The End of the Free Ride, G. Porter; Improved X-Ray and Gamma-Ray Measurements Have Several Applications, R. Deslattes; NBS Opens New Industrial Furnace Facility, M. Baum; Surface Magnetism Studied Using Polarized Electrons, D. T. Pierce; Definitive Measurements of Constituents of Human Serum, E. White; Conferences, Publications, News briefs.

PB80-170251 Not available NTIS
National Bureau of Standards, Washington, DC.
Characterization of the Electric Environment Under HVDC Transmission Lines: Instrumentation and Measurement.
Final rept.,
F. R. Kotter. Aug 79, 29p
Pub. in Proceedings of the Workshop on Electrical and Biological Effects Related to HVDC Transmission, Richland, WA, October 19-20, 1978, Paper PNL-3121, UC97a, p2.1-2.29 1979.

The instrumentation and measurement techniques used in atmospheric electricity research which have possible application for use in studying conditions in the vicinity of high-voltage direct-current transmission lines are reviewed. Thirty-four references are given.

PB80-176753 PC **A02**
Oregon State Univ., Corvallis. Sea Grant Coll. Program.
Analyses of Hinged Wavemakers for Random Waves,
Robert T. Hudspeth, Douglas F. Jones, and John H. Nath. 1978, 17p ORESU-R-79-017, NOAA-80032105
Grant NOAA-04-7-158-44085
Pub. in Proceedings of Coastal Engineering Conference (16th) Held at ASCE/Hamburg, W. Germany on Aug. 28-Sept. 1, 1978, p372-387.

The theoretical dimensionless frequency response functions for the wavemaker stroke spectrum QS(w), and for the wavemaker dynamic pressure moment spectrum, QM(w), were verified experimentally from random waves which were simulated from two types of two-parameter theoretical design wave spectra. The random motions of the wavemaker were first digitally simulated by a unique inverse stacked FFT algorithm which were then used to drive the wavemaker through digital-to-analog converters (DAC). The dimensionless frequency response function for the hydrodynamic pressure moment spectrum was not measured directly but was computed from the dynamic covariance equations for a hinged wavemaker of variable-draft by linear combinations of related dimensionless frequency response functions and cross-spectral estimates. The measured estimates were found to agree reasonably well with the analytical approximations, and these measured stochastic hydrodynamic pressure moment estimates on a hinged wavemaker of variable-draft are believed to be unique.

SAND-78-2069 PC **A02**/MF **A01**
Sandia Labs., Albuquerque, NM.
Evaluation of Hand-Held Ion-Mobility Explosives Vapor Detectors.
T. A. Burrows, and P. J. Thoma. Dec 79, 17p
Contract EY-76-C-04-0789

Two types of ion-mobility detectors were evaluated in both laboratory and field tests. Laboratory test results show that these detectors are highly sensitive to dynamite and pistol powder and have good false-alarm agent rejection. Field tests of these two detectors revealed that they would detect dynamite and Ball-C-Propellent in free air. However, neither of the ion-mobility detectors would detect these explosives if the explosives were concealed. (ERA citation 05:012386)

SAND-79-1714C PC **A03**/MF **A01**
Sandia Labs., Albuquerque, NM.
Development of a Laser Interferometric Dilatometer.
W. D. Drotning. 1979, 32p CONF-791134-6
Contract EY-76-C-04-0789
16. international thermal conductivity conference, Chicago, IL, USA, 7 Nov 1979.

The development of a high precision dilatometer using laser interferometry is described. Design criteria require operation over a temperature range from ambient to 900 exp 0 K with a length change sensitivity of ten microinches (0.25 mu m) or less. The dilatometer is designed to achieve rapid sample turnaround for quality control measurements in a production environment. To achieve this, design features are incorporated which minimize sample preparation time by relaxing critical size and shape restrictions on test samples. The length change measurement is based on a modified Michelson interferometer using a two-frequency HeNe laser and ac detection of fringes. The final critical alignment of the interferometer during sample installation is achieved by automatic computer control. This alignment control feature can be used to maximize interferometer alignment continuously through the course of a run. The furnace system incorporates a low thermal mass heating chamber to achieve rapid thermal response with minimal thermal disturbance to the interferometer system. Flexibility and reproducibility in heating schedules are achieved through digital control. Dilatometer control and data acquisition functions are accomplished by a minicomputer using a standard interface bus. (ERA citation 05:012390)

UCID-18493 PC **A03**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Computer Controlled Calibration System: CBU. Users Guide.
E. Ables. 4 Dec 79, 27p
Contract W-7405-ENG-48

The calibration system is a collection of special-purpose CAMAC modules that provide programmable calibration signals for the purpose of calibrating data acquisition systems used to collect data from various types of transducers. The processor-based controller receives high-level English-type commands over a IEEE-488 bus, interprets the commands, then translates them into command signals to the calibration modules. CAMAC's modular structure provides easy configuration of a calibration system to match the data acquisition system. 11 figures. (ERA citation 05:012391)

UNI-1405 PC **A04**/MF **A01**
United Nuclear Industries, Inc., Richland, WA.
Ultrasonic Flowmeters.
W. D. Wittekind. 12 Nov 79, 58p
Contract EY-76-C-06-1857

A prototype ultrasonic flowmeter was assembled and tested. The theoretical basis of this prototype ultrasonic flowmeter is reviewed; the equipment requirements for a portable unit are discussed; the individual electronic modules contained in the prototype are described; the operating procedures and configuration are explained; and the data from preliminary calibrations are presented. The calibration data confirm that the prototype operates according to theoretical predictions and can indeed provide nonintrusive flow measurements to predicted accuracies for pipes larger than two inches, under single phase stable flow conditions. (ERA citation 05:010490)

Y/DW-2 PC **A02**/MF **A01**
Oak Ridge Y-12 Plant, TN.
Automatic Noise-Blanking, Pulse-Timing Discriminator for Ultrasonic Nondestructive Testing.
M. G. Duncan. 1979, 8p CONF-7909109-2
Contract W-7405-ENG-26
Ultrasonics Symposium, New Orleans, LA, USA, 26 Sep 1979.

A new, easy to operate, pulse-timing discriminator has been developed for production inspection of parts. This instrument combines the noise-blanking advantages of threshold discrimination with the echo-timing precision of zero-crossing discrimination by using a shaped threshold detector output to enable a zero-crossng discriminator only when the RF ultrasonic signal exceeds an adjustable threshold. Flip-flops are then used to separate the echoes. Discriminator timing walk for a 30-dB amplitude change of a 5-MHz transducer waveform is only 200 psec, while timing jitter is only 30 psec. Long-term timing stability is 100 psec. In thickness gaging, a 200-psec timing error corresponds to an error of 0.64 micrometer in aluminum. An automatic polarity selection system corrects for pulse polarity inversions A time-to-pulse-height converter allows operation as a B-scan instrument capable of detecting flaws at depths of 0.25 mm in aluminum. (ERA citation 05:010491)

14D. Reliability

AD-A082 510/9 PC **A05**/MF **A01**
Office of the Project Manager STINGER Redstone Arsenal AL
Estimating the System Reliability Lower Confidence Limit from Data Derived from System and Subsystem Test Results.
Technical rept.,
Julian L. Cothran. Sep 79, 89p Rept no. DRCPM-MP-79-1

Presently a problem exists in being able to present a confidence level on missile weapon reliability. This paper suggests a method for solving the problem. This method provides the means for estimating the system reliability lower confidence limit with specified confidence level from reliability phase scoring data derived from system and subsystem test results; and yields a quick and good approximation to a more rigorous and lengthy analysis. The method does not require any assumptions concerning the form of the reliability phase distributions nor their test sample size. This paper formulates and demonstrates the suggested method and then compares it with several others. The method is then applied to a realistic missile weapon system in its development life cycle phase. A comprehensive explanation of the testing philosophy and reliability phase scoring criteria and methodology is given. (Author)

AD-A083 009/1 PC **A03**/MF **A01**
Southeastern Center for Electrical Engineering Education Inc Orlando FL
Bayesian Reliability Theory for Repairable Equipment.
Final technical rept. 1 Jun-30 Sep 79,
Theodore S. Bolis. Feb 80, 30p RADC-TR-80-30
Contract F30602-78-C-0148

This report introduces an assumption called instantaneous resurrection which holds that a repaired equipment is returned to the state of an equipment of similar age which has not yet failed, rather than to the state of a new equipment. Under this assumption, the number of failures of an equipment in time t is a Poisson process with leading function - log R(t), where R(t) is the reliability function of the equipment. This fact can be used in the estimation of parameters of various prior distributions via the appropriate Poisson mixtures. The case of the two-way truncated Gamma prior and its limiting forms is discussed in the report. (Author)

14E. Reprography

PAT-APPL-6-109 379 PC **A02**/MF **A01**
Department of the Army Washington DC
Holographic Plate Exposure Meter.
Patent Application,
Robert W. Jones. Filed 3 Jan 80, 7p AD-D007 098/7
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

This document discloses a photographic exposure meter in visualization equipment for detecting the presence or absence of a pulse of laser light on a target. Light from a laser pulse which forms the hologram, is scattered when it impinges on the target plate and detected by a photodetector, the resultant pulse signal being integrated and amplified. The output pulse, proportional to the hologram exposure, is fed to a storage oscilloscope for convenient display. (Author)

PAT-APPL-6-114 916 PC **A02**/MF **A01**
Department of the Army Washington DC
Laser Scanner Transport.
Patent Application,
Richard D. Scott. Filed 24 Jan 80, 13p AD-D007 095/3
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

This document discloses an electromechanical means, forming part of a high speed printer, to cause a 45 deg mirror to simultaneously rotate on its axis and translate back and forth inside a transparent cylinder, thereby causing a modulated laser beam directed onto said mirror along the axis of said cylinder to describe a helical scanning pattern on said cylinder and the printing medium thereon. (Author)

PATENT-4 158 503 Not available NTIS
Department of the Army Washington DC
Heterodyne Optical Correlator.
Patent,
N. Balasubramanian. Filed 30 Sep 77, patented 19 Jun 79, 10p AD-D007 091/2, PAT-APPL-838 288
Supersedes PAT-APPL-838 288-77.
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

A heterodyne optical correlator allows a correlation function to be computed for plural portions of a stereo pair of transparencies which is normalized to thus reduce the possibility of false correlation peaks. To obtain the correlation function, a pair of stereo transparencies are illuminated by an intense monochromatic light source producing an image at a common image plane in which a detector array is located. The relative path length, between source and transparencies, is periodically modulated producing at plural locations of the detector array plural alternating current signals representing the correlation between the amplitude transmittances at various corresponding locations on the transparencies for a given relative displacement between the transparencies. To normalize this correlation coefficient a second signal is produced by illuminating only one transparency and a corresponding third signal is produced by illuminating only the other transparency. Plotting the normalized correlation coefficient at each of the plurality of points in the transparencies as the relative positioning of the transparencies is shifted allows the correlation function and its peak to be determined.

UCID-18520 PC **A02**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Streakcamera Aperture Function.
D. Dunbar. 12 Dec 79, 14p
Contract W-7405-ENG-48

The aperture function of a streaktube is derived. It defines the input spectrum as a function of time and space. It is found that the zeros of the aperture function depend inversely on aperture size and sweep time. (ERA citation 05:012392)

15. MILITARY SCIENCES

15B. Chemical, Biological, and Radiological Warfare

PAT-APPL-6-078 892 PC **A02**/MF **A01**
Department of the Army Washington DC
Multipurpose Humidity Controlled Agent Generator.
Patent Application,
Kwok Y. Ong. Filed 24 Oct 79, 16p AD-D007 114/2
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

The principal object of this invention is to provide an agent generation system and method for calibrating and testing the agent sensitivity of agent detector alarm system under varying conditions of relative humidity and temperature. Another object of this invention is to provide an agent dilution system which will give a controlled concentration of agent vapor or agent aerosol under various controlled conditions of relative humidity and temperature. A further object of this invention is to provide a multi-purpose chemical agent generation system which has interchangeable agent test chambers to avoid inter-agent contamination. A still further object of this invention is to provide an agent generation system having a test chamber which allows exposure of a detector item from within the chamber or from outside the chamber by means of a sample port. An additional object of this invention is to provide an agent generation system which will allow testing of an agent detector alarm by either static or dynamic exposure to agent laden air.

15C. Defense

AD-A082 460/7 PC **A03**/MF **A01**
Massachusetts Inst of Tech Lexington Lincoln Lab
A Simple Graphical Model for Analyzing Radar Homing Interceptor Engagements.
Technical note,
Stephen D. Weiner. 17 Dec 79, 50p TN-1979-82, ESD-TR-79-284
Contract F19628-80-C-0002

In this note, a simplified model of radar homing interceptor engagements is described. This model permits analysis of the interaction among sensor parameters such as angular accuracy and acquisition range, interceptor parameters such as maneuver limits and response time and system parameters such as closing velocity and handover accuracy. Simple expressions are obtained for the sensor prediction accuracy using various types of range-dependent measurement errors. These include glint, instrumentation error and thermal error for both active and semi-active sensors. A simple graphical technique is used to determine the feasibility of a homing engagement and to estimate the resulting miss-distance. A set of nomograms is included to permit full variation of the system and component parameters. (Author)

AD-A082 961/4 PC **A05**/MF **A01**
Advisory Group for Aerospace Research and Development Neuilly-sur-Seine (France)
AGARD Bulletin. Meetings, Publications, Membership.
Jan 80, 86p Rept no. AGARD-BUL-80/1

No abstract available.

PAT-APPL-6-021 291 PC **A02**/MF **A01**
Department of Energy, Washington, DC.
Improved Magnetic Encoding Device and Method for Making the Same.
Patent Application,
R. J. Fox. Filed 16 Mar 79, 13p
Contract W-7405-ENG-26
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A magnetic encoding device and method for making the same are provided for use as magnetic storage media in identification control applications that give output signals from a reader that are of shorter duration and substantially greater magnitude than those of the prior art. Magnetic encoding elements are produced by uniformly bending wire or strip stock of a magnetic material longitudinally about a common radius to exceed the elastic limit of the material and subsequently mounting the material so that it is restrained in an unbent position on a substrate of nonmagnetic material. The elements are spot weld attached to a substrate to form a binary coded array of elements according to a desired binary code. The coded substrate may be enclosed in a plastic laminate structure. Such devices may be used for security badges, key cards, and the like and may have many other applications. 7 figures. (ERA citation 05:019267)

PAT-APPL-6-126 073 PC **A02**/MF **A01**
Department of the Air Force Washington DC
Physical Deterrent Barrier with Upward Looking Detection Sensor for Intruder Detection System.
Patent Application,
Nicholas V. Karas. Filed 29 Feb 80, 14p AD-D007 132/4
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A physical deterrent barrier is utilized as an integral part of an intruder detection sensor that provides surveillance of intrusions in the air space over the barrier. The sensor includes a corner reflecting antenna that is coextensive with and mounted on the top of the barrier. The antenna is fed from a leaky transmission line and it illuminates the air space over the barrier with r.f. energy from the intrusion detection system transmitter. Reflections caused by intrusions over the barrier are processed by detection system signal processing equipment to determine the incidence and locations of intrusion events. In a preferred embodiment the sensor is integrated into a barbed wire topped chain link fence by arranging appropriately spaced parallel strands of barbed wire into a V configuration so as to effect an electrical corner reflector at the system operating frequency. (Author)

15D. Intelligence

AD-A082 442/5 PC **A08**/MF **A01**
IBM Federal Systems Div Arlington VA

Intelligence Preparation of the Battlefield (Automated) IPB(A).
Final rept. on Phase 2.
14 Feb 80, 169p
Contract DAAK21-79-C-0040
Original contains color plates: All DTIC and NTIS reproductions will be in black and white.

This report describes an operational concept for automated IPB operations, and summarizes an approach to representing terrain data on a CRT in terms of its impact on ground force mobility. It includes a similar approach to ground intervisibility, and a means of incorporating current weather information to provide effects on both mobility and intervisibility. A major emphasis is on describing automated IPB products and explaining how they could be (1) constructed in the field during normal planning cycles, and (2) used during hostilities to support intelligence functions, operation functions, and the commander's decision process.

AD-A082 631/3 PC **A07**/MF **A01**
IBM Federal Systems Div Arlington VA
Intelligence Preparation of the Battlefield (IPB)-An Automated Approach to Terrain and Mobility Corridor Analysis.
Final rept. on Phase A.
20 Oct 78, 142p
Contract DAAG39-78-C-0106
Report on Tactical Intelligence Applications Experimentation (TIAX). Original contains color plates: All DTIC and NTIS reproductions will be in black and white.

This report provides a descriptive summary of the results of the terrain and concept development phase of the BSI contract with IBM. It sets forth an operational concept for the use of IPB products in real time and describes the demonstrations that displayed the use of automated terrain data. The report advances the thesis that IPB(A) provides a standard analytical methodology for the integrated evaluation of the three factors of combat intelligence: enemy, weather and terrain. It serves as a basis for continued investigation, and for developing appropriate software programs that will enhance the Army's ability to prepare for war prior to outbreak of hostilities. (Author)

15E. Logistics

AD-A082 689/1 PC **A15**/MF **A01**
Kappa Systems Inc Arlington VA
Logistic Incentive Structures Reflected in Irregular Logistic Procedures.
Final rept. 8 Nov 78-31 Jan 80,
James R. Brownell, Jr., Elaine Rubin, Michael Jon Stoil, and Charles E. Thomann. 31 Jan 80, 348p
Contract MDA903-79-C-0157, DARPA Order-3666

This report defines the basic concept of the incentive structure for the use of irregular (unauthorized) logistic procedures in the military, and presents the findings of a 1979 field survey in which helicopter maintenance, supply, and command personnel provided data on the situational and motivational contexts for the use of irregular procedures. The conclusions and recommendations emphasize the perceived need for some use of irregular logistic procedures in overcoming the lack of immediate availability of items necessary for mission accomplishment. Appendices provide additional quantitative and qualitative findings.

AD-A082 799/8 MF **A01**
Institute for Defense Analyses Arlington VA Program Analysis Div
A Model for the Analysis of Stockpile/Production Base Tradeoffs.
Final rept.,
Jeffrey H. Grotte, and Paul F. McCoy. Mar 79, 163p IDA-P-1418, IDA/HQ-79-21352, AD-E500 127
Contract MDA903-79-C-0018

Meeting the wartime requirements for consumable materiel, particularly for ammunition, generally requires a stockpile for meeting initial needs, and a production base, for building the stockpile and also for supplying long-term demands if the war is of sufficiently great duration. During peacetime, stockpile and production base are complements--enlarged production bases result in a larger stockpile--but during wartime, they are (to a degree) substitute means of supplying the consumable. This paper presents a linear programming model that determines the least cost mix of stockpile and production base necessary to satisfy wartime consumption. The model includes a build-up period during which production base is acquired and the stockpile is built, a steady-state period during which assets are at maintained post-build-up levels until the start of the war, and a mobilization-and-war period during which demand for the consumable must be met, either through stockpile depletion or through wartime production from previously acquired base. The model is fast running and allows the user great flexibility in specifying the planning scenario.

AD-A082 805/3 PC **A08**/MF **A01**
Deputy Chief of Staff for Research Development and Acquisition (Army) Washington DC
Department of the Army Justification of Estimates for Fiscal Year 1981, Submitted to Congress January 1980, Procurement Programs, Aircraft, Missiles, Weapons & Tracked Combat Vehicles, Ammunition and other Procurement, Army. Part 1.
Jan 80, 168p
See also part 2, AD-A082 806.

In justification of programs requested, this document, in separate volume for aircraft Procurement Appropriations, provides backup data for the Army Budget submission for FY 1981. Included are Summaries of Requirements, Program and Financing Statements and Selected Data Sheets.

AD-A082 806/1 PC **A04**/MF **A01**
Deputy Chief of Staff for Research Development and Acquisition (Army) Washington DC
Department of the Army Justification of Estimates for Fiscal Year 1981, Submitted to Congress January 1980, Procurement Programs, Aircraft, Missiles, Weapons & Tracked Combat Vehicles, Ammunition and other Procurement, Army. Part 2.
Jan 80, 55p
See also part 3, AD-A082 807.

In justification of programs requested, this document, in separate volume for missile Procurement Appropriations, provides backup data for the Army Budget submission for FY 1981. Included are Summaries of Requirements, Program and Financing STatements and Selected Data Sheets.

AD-A082 807/9 PC **A03**/MF **A01**
Deputy Chief of Staff for Research Development and Acquisition (Army) Washington DC
Department of the Army Justification of Estimates for Fiscal Year 1981, Submitted to Congress January 1980, Procurement Programs, Aircraft, Missiles, Weapons & Tracked Combat Vehicles, Ammunition and other Procurement, Army. Part 3.
Jan 80, 46p
See also part 4, AD-A082 808.

In justification of programs requested, this document, in separate volume for weapons and tracked combat vehicles Procurement Appropriations, provides backup data for the Army Budget submission for FY 1981. Included are Summaries of Requirements, Program and Financing Statements and Selected Data Sheets.

AD-A082 808/7 PC **A03**/MF **A01**
Deputy Chief of Staff for Research Development and Acquisition (Army) Washington DC
Department of the Army Justification of Estimates for Fiscal Year 1981, Submitted to Congress January 1980, Procurement Programs, Aircraft, Missiles, Weapons & Tracked Combat Vehicles, Ammunition and Other Procurement, Army. Part 4.
Jan 80, 45p
See also part 5. AD-A082 809.

In justification of programs requested, this document, in separate volume for ammunition Procurement Appropriations, provides backup data for the Army Budget submission for FY 1981. Included are Summaries of Requirements, Program and Financing Statements and Selected Data Sheets.

AD-A082 809/5 PC **A06**/MF **A01**
Deputy Chief of Staff for Research Development and Acquisition (Army) Washington DC
Department of the Army Justification of Estimates for Fiscal Year 1981, Submitted to Congress January 1980, Procurement Programs, Aircraft, Missiles, Weapons & Tracked Combat Vehicles, Ammunition and other Procurement, Army. Part 5.
Jan 80, 123p
See also part 1, AD-A082 805.

In justification of programs requested, this document, in separate volume for other Army Procurement Appropriations, provides backup data for the Army Budget submission for FY 1981. Included are summaries of Requirements, Program and Financing Statements and Selected Data Sheets.

AD-A082 810/3 PC **A04**/MF **A01**
Deputy Chief of Staff for Research Development and Acquisition (Army) Washington DC
Department of the Army Procurement Programs, Supporting Data for FY 81 Budget Estimate, The President's Budget, January 1980.
Jan 80, 73p

Exhibit P-1 document contains prior, current and budget year quantities and dollars for Aircraft, Missiles, Weapons & Tracked Combat Vehicles, Ammunition and Other Procurement, Army Appropriations programs contained in the President's FY 81 Budget, submitted January 1980.

AD-A082 987/9 PC **A04**/MF **A01**
Human Engineering Lab Aberdeen Proving Ground MD
Use of Rough Terrain Forklifts for Night Ammunition Transfer Tasks.
Final rept.,
Bernard M. Davall. Feb 80, 60p Rept no. HEL-TN-3-80

This report summarizes the testing efforts to prove a constrained, soft white light illumination concept for use on rough terrain forklifts performing night ammunition transfer task in the forward battle area. (Author)

AD-A082 997/8 PC **A04**/MF **A01**
Air Force Academy CO
An Analysis of Air Force Economic Order Quantity Type Inventory Data with an Application to Reorder Point Calculation.
Final rept.,
Charles R. Mitchell, Robert A. Rappold, and Wayne B. Faulkner. Apr 80, 70p Rept no. USAFA-TR-80-6

One of the important uses of an Economic Order Quantity (EOQ) item's distribution of lead time demand is to set its reorder point (when to order new stock). The current Air Force system computes the reorder point by assuming that demand during lead time is normally distributed. Analysis shows that a more realistic model of observed demand patterns can be chosen from the compound Poisson family of distributions. This study uses the geometric-Poisson and constant-Poisson members of that family. Fixed and variable lead times are allowed for. The ultimate objective is to understand, as exactly as possible, the true underlying random processes involved in the EOQ supply system. A second objective is to allow for a probability model that could be implemented in a large base supply account. Data from eight federal stock groups and four bases (three CONUS and one overseas) are analyzed. Approximately 10,000 items are involved. We analyze individual customer arrival and demand processes as well as empirical lead time data. The primary emphasis is on fitting the assumed geometric-Poisson and constant-Poisson model to the data. The geometric-Poisson model is taken to be a better representation of the actual arrival and demand processes than the constant-Poisson model. Although the latter model is a cruder approximation, it represents an easier model for possible implementation. Both models are shown to be more representative of actual data than the normal distribution assumption. Both models perform better in setting hypothetical reorder points than the current model.

AD-A083 026/5 PC **A07**/MF **A01**
Air Force Inst of Tech Wright-Patterson AFB OH School of Systems and Logistics

The Supply Effectiveness of Cooperative Logistics.
Master's thesis,
Kimble D. Pendley, and Griffin L. Ratley. Jun 79, 129p Rept no. AFIT-LSSR-28-79A

The purpose of this research was to compare the levels of supply support afforded to different types of foreign Military Sales (FMS) customers. To do so, we compared requisition response times for investment (depot reparable) items and critical investment assets. We tested for a significant difference in requisition service days between demands against Cooperative Logistics Supply Support arrangements (CLSSA) and Blanket Order cases. The technique used was Analysis of Variance (ANOVA). The primary variables were requisition service days and requisition type (programmed or non-programmed) issue priority and procurement lead time were secondary variables. Two years of requisition data from all FMS countries were sampled. The data supported the null hypothesis--that there is no statistically discernible difference between CLSSA (programmed) requisitions and Blanket Order Case (non-programmed) demands. (Author)

PAT-APPL-6-077 862 PC **A02**/MF **A01**
Department of the Army Washington DC
Cargo Container Transporter.
Patent Application,
E. Concha, M. Jaffe, and R. Bedford. Filed 21 Sep 79, 12p AD-D007 115/9
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

No abstract available.

15F. Nuclear Warfare

ORNL-5546 PC **A05**/MF **A01**
Oak Ridge National Lab., TN.
Instrumentation Requirements for Radiological Defense for Crisis Relocation Planning. Final Report.
C. M. Haaland, and B. M. Horwedel. Dec 79, 97p
Contract W-7405-ENG-26

Estimates are made of radiological instrument requirements for the US population to provide guidance for protection from the hazards of nuclear radiation from a nuclear attack. Much of the population is assumed to be relocated from risk areas according to Crisis Relocation Planning (CRP). The population is assumed to be distributed in shelters as follows: 34% in shelters in the National Shelter Survey (NSS); 17% in facilities upgraded for fallout protection during a crisis period (CRP facilities); 42% in home basements; and 7% in expedient shelters. To prevent overexposure to nuclear radiation on emergence from shelters and to reduce long-term carcinogenic and genetic effects, about 35 million dosimeters, 9 million survey meters, and 10 million chargers would be required. (ERA citation 05:012899)

UCID-18494(Pt.2) PC **A03**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Conflict Simulation Laboratory-II. Part 2. Design Comcept.
H. S. Ames, and S. A. Bly. 10 Dec 79, 47p
Contract W-7405-ENG-48

The Conflict Simulation Laboratory (CSL) is a part of D-Division and provides graphic and computation tools to model nuclear combat through simulated tactical battlefields and war games. In order to alleviate some of the limitations and problems of the Conflict Simulation Laboratory it is proposed that the current facilities be enhanced. A recommended design is presented. The design is a first-level design with sufficient detail to enable the generation of development schedules, the prediction of costs and the formulation of hardware specifications. The actual hardware and software purchased will depend on the funds available. (ERA citation 05:012407)

UCID-18494(Pt.4) PC **A02**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Conflict Simulation Laboratory-II, Part 4. Standard Implementation Plan.
H. S. Ames, and S. A. Bly. 20 Dec 79, 14p
Contract W-7405-ENG-48

The Conflict Simulation Laboratory provides graphic and computational tools to model nuclear combat through simulated tactical battlefields and war games. Limitations of present equipment are noted, and a new hardware-software system is proposed. Estimated costs, scheduling, justification of need, and similar administrative information are given. 1 figure, 2 tables. (ERA citation 05:014603)

UCRL-50016-80-1 PC **A04**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Mechanical Engineering Department. Technical Review.
W. B. Simecka, R. A. Condouris, and C. Talaber. 1 Jan 80, 64p
Contract W-7405-ENG-48

The Mechanical Engineering Department Technical Review is published to (1) inform the readers of various technical activities within the Department, (2) promote exchange of ideas, and (3) give credit to the personnel who are achieving the results. The report is formatted into two parts: technical achievements and publication abstracts. The first is divided into eight sections, one for each Division in the Department providing the reader with the names of the personnel and the Division accomplishing the work. (ERA citation 05:012408)

UCRL-52771 PC **A02**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Approach to Evaluating and Implementing EMP Protection Requirements for Communication Centers.
H. S. Cabayan, F. J. Deadrick, and L. C. Martin. 1 May 79, 20p
Contract W-7405-ENG-48

The problem of protecting communication centers against the threat of high-altitude nuclear electromagnetic pulses (EMP) has been examined. Because such EMP could damage components in an unprotected facility, an approach to develop a set of minimum requirements so that effective hardening procedures can be designed and implemented is described. The approach includes evaluation of currently recommended protection practices, cost analyses, and development of test requirements, plans, and facilities. (ERA citation 05:010504)

UCRL-52804 PC **A03**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Probabilistic Approach to EMP Assessment.
R. M. Bevensee, H. S. Cabayan, F. J. Deadrick, L. C. Martin, and R. W. Mensing. Aug 79, 50p
Contract W-7405-ENG-48

The development of nuclear EMP hardness requirements must account for uncertainties in the environment, in interaction and coupling, and in the susceptibility of subsystems and components. Typical uncertainties of the last two kinds are briefly summarized, and an assessment methodology is outlined, based on a probabilistic approach that encompasses the basic concepts of reliability. It is suggested that statements of survivability be made compatible with system reliability. Validation of the approach taken for simple antenna/circuit systems is performed with experiments and calculations that involve a Transient Electromagnetic Range, numerical antenna modeling, separate device failure data, and a failure analysis computer program. (ERA citation 05:012409)

15G. Operations, Strategy, and Tactics

AD-A082 467/2 PC **A04**/MF **A01**
Naval Underwater Systems Center Newport RI
An Effectiveness Prediction Model for Submarine Missile Systems.
Technical rept.,
Vincent J. Aidala, and Joseph J. Perruzzi. 15 Feb 80, 59p Rept no. NUSC-TR-5822

This technical report describes a real-time procedure for predicting the effectiveness of submarine missile attacks against prescribed target threats. Mathematical relationships are established which allow the probability of target damage to be expressed in terms of missile aimpoint error statistics, weapon damage characteristics, and target localization error statistics. These formulas are subsequently transformed into a compact computational algorithm, suitable for making on-line weapon performance predictions via digital computer. (Author)

AD-A082 740/2 PC **A05**/MF **A01**
RAND Corp Santa Monica CA
Resource Readiness of Armored Units.
Interim rept.,
Robert Shishko, and Robert M. Paulson. Nov 79, 91p Rept no. RAND/N-1299-MRAL
Contract MDA903-77-C-0108

This is a report of the initial work on a project to develop a method of assessing the relationship between the resources available to and relative readiness of Army maneuver and firepower units. A concept is presented which differentiates between the current method of reporting on the status of resources available to tank battalions (AR 220-1) and an alternative which presents estimates of the capability of a battalion to generate ready platoons trained, equipped and provisioned for specific operations. This concept highlights the difference between available resources (inputs) and a unit's Specific Operational Capability (SOC) to perform an OPLAN defined mission (output). The concept is evaluated in a simulation term AURA (Armored Unit Readiness Assessor) and the results provide examples of how readiness is effected by tasking and attrition assumptions. The report also raises issues concerning the purposes for readiness assessment and the tasks remaining to further evaluate readiness assessment methods for Army Units. (Author)

AD-A082 761/8 PC **A08**/MF **A01**
Science Applications Inc McLean VA
Design of an Integrated Division - Level Battle Simulation for Research, Development, and Training. Volume I.
Final rept. 1 Aug 78-15 Aug 79,
Roland V. Tiede, Roger A. Burt, and Theodore T. Bean. Aug 79, 158p SAI-80-946-WA, ARI-TR-420
Contract MDA903-78-C-2030
See also Volume 2, AD-A082 062.

This volume describes the structural framework of the simulation and the considerations that entered into its design. The requirement is to develop a top-down design for an integrated family of modular division-level battle simulations which separately or jointly will exercise players performing critical functions in command and control. The design approach involved the following principles: selection of the decision variables to be manipulated by the division staff modules and the event threads both within and external to the staff modules thereby fixing the event sequence and time of occurrence; and incorporating into the simulation every event thread needed to support the input/output relationship. The dynamic realism needed to place decision makers in a realistic environment is achieved by means of an event store technique. The five classes of events of which the event threads are composed are defined and the logical flow of the event store simulation is illustrated. A sixth class of event needed for operation in an ADP-assisted mode is also defined. The approach begins at the heart of the information system, the decisions, and then develops the simulation needed to implement them--the inverse of the usual approach. The design concept provides for a man in the loop in that any one or any combination of five basic staff modules (Cmd Grp, G-2, G-3, G-1/G-4, FSCE) plus one enemy module (Cmd Grp) may be either occupied by human players or simulated.

AD-A082 857/4 PC **A09**/MF **A01**
Command and Control Technical Center Washington DC
A Survey of Long-Range Forecasting Models and Data Resources: A Method for Their Application at the Department of Defense.
Technical rept,
R. G. Miller, B. L. Marshall, P. M. Kramer-DeBuck, J. C. Nauta, and R. Pouliot. 8 Aug 79, 196p CCTC-TR-127-79, AD-E100 346

This Technical Report presents the results of a review of forecasting methods, computer programs, environmental indicators, and data sources of potential use in the preparation of long-range (10 to 20 years) planning documents at the Department of Defense. This report recommends that DoD long-rang planning be conducted on a general probabilistic basis, identifying the factors of national power, forecasting their most likely status on a national and regional basis, and assesing the political implications of these future power relationships accordingly. It suggests Ray Cline's Percieved Power equation as the vehicle for such an approach and recommends a 'family' of forecasting models using Mesarovic's APT interactive software to provide needed inputs to the equation. It identifies 18 forecasting models and 59 data resources as meriting further investigation for thier potential use in such an effort.

AD-A082 930/9 PC **A04**/MF **A01**
Kinton Inc Alexandria VA
Battle Simulation Board Games: An Analysis in Terms of Design Characteristics and Leader Skills.
Research note,
Donald R. Jones, Jr., Peter B. Wylie, Kermit F. Henriksen, Edgar L. Shriver, and David L. Hannaman. Jan 80, 60p ARI-RN-80-2
Contract MDA903-78-C-2005

The objective of this effort was to analyze three small unit battle simulation board games in terms of design characteristics, leader skill practice opportunity, and psychological fidelity. Three battle simulation board games--Tactical Opposition Exercise (TOX), Small Combat Unit Evaluation (SCUE), and Dunn-Kempf--were rated by the authors with respect to: (a) their administrative and design characteristics, (b) the degree to which they provide leaders with an opportunity for practicing leader skill, and (c) the degree to which they provide fidelity, i.e., require players to perform the same action as required in combat or engagement simulation exercises. Differences were found among the three battle simulation board games with respect to administrative and design characteristics, fidelity, and opportunity to practice leader skills. In general, TOX and SCUE received their highest ratings for training on problem solving and communication skills, whereas Dunn-Kempf received its highest ratings for training on technical skills, such as terrain analysis. (Author)

AD-A082 950/7 MF **A01**
Honeywell Inc Minneapolis MN
Development and Application of Decision Aid for Tactical Control of Battlefield Operations: Bibliographic Sort of the Decision Aiding Literature.
Research memo.,
J. M. Erickson, and R. A. Levit. Dec 73, 156p
ARI-RM-73-3
Contract DAHC19-73-C-0069
Availability: Microfiche copies only.

This memorandum provides the researcher with a current bibliography on decision aiding and decision making in man/computer systems. Since decision-aiding overlaps the huge technical area encompassed by decision-making, the literature collected has been selective. Thus, a study included in the bibliography must have met one of the following criteria: (1) Contains a working decision aid in a man/computer decision-making environment; (2) Contains a model of decision making, from which an aid can be derived; (3) Contains useful information on tactical information processing; and/or (4) Contains useful information on methodological aspects of decision aiding in man/computer contexts. Papers were chosen primarily from post-1960 materials derived from Published scientific studies, industrial and governmental technical reports, or Unpublished reports of research in progress.

16. MISSILE TECHNOLOGY

16A. Missile Launching and Ground Support

PAT-APPL-6-107 236 PC **A02**/MF **A01**
Department of the Navy Washington DC
Boost Assisted Missile Launcher,
Patent Application,
Lloyd J. Holt, and Clayton Pantaqui. Filed 26 Dec 79, 22p AD-D007 084/7
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

This invention pertains to missile launching apparatus. In particular, it pertains to self powered missile launching apparatus which accelerates the missile to launch speed during initiation of a rocket motor. In even greater particularity, the present invention pertains to boost assisted missile launchings which do not require external fasteners on missiles which interfere with aerodynamic performance.

16C. Missile Warheads and Fuses

AD-A082 564/6 MF **A01**
Raymond Engineering Inc Middletown CT
Pneumatic Control Device for the Pershing II Adaption Kit.
Final technical rept.
14 Mar 79, 189p
Contract DAAK10-77-C-0007
Availability: Microfiche copies only.

A preliminary operating model (POM) for the Pneumatic Control Device (PCD) has been developed and is in line with the referenced contractual requirements. The PCD preliminary design was formulated and documented in the 31 August, 1977 Interim Technical Report. Development effort for the pneumatic control POM includes the completion of all detail drawings and their revisions, breadboard tests of the reentry sensor and gas generator, fabrication of POM parts, assembly and evaluation of the first POM, gas generator tests with POM parts for the generator and valve, interface and demonstration of PCD with SACA POM units, preparation for and completion of the twelve contractually required gas generator tests, support of the five gas generator/turboalternator compatibility tests at Garrett, analysis and verification testing of cold gas generator anomaly observed during compatibility tests, completion of the preliminary safety and reliability analysis, and preparation of associated software. (Author)

16D. Missiles

PAT-APPL-6-126 778 PC **A02**/MF **A01**
Department of the Navy Washington DC
High Torque/Acceleration Stabilized Sensor Platform.
Patent Application,
Frederick D. Groutage. Filed 3 Mar 80, 14p AD-D007 077/1
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

This document discloses a dual gimbal high torque/acceleration stabilized platform including an outer gimbal ring and gimbal torquer and an inner gimbal gear and torque motor. The inner gimbal torque motor is secured to the outer gimbal ring to permit increased weight and volume sensors to be packaged and located at the center of rotation of the gimbal axis. (Author)

SAND-79-1209 PC **A02**/MF **A01**
Sandia Labs., Albuquerque, NM.
Effects of Turbulence and Delay in Activating TIGER II after Low Altitude Release.
R. W. Greene. Nov 79, 25p
Contract EY-76-C-04-0789

The effects that specified delays in activating the thrust and control system have on the altitude history of a TIGER-II vehicle released from an F-4 and F-111 were analyzed using a three degree-of-freedom analog simulation. Desirable delay times were identified that would allow acceptable ground clearance when releasing from 100-ft altitude. The effect that atmospheric turbulence had on the vehicle was considered for the defined time delays. (ERA citation 05:012272)

17. NAVIGATION, DETECTION, COMMUNICATIONS, AND COUNTERMEASURES

17A. Acoustic Detection

AD-A082 694/1 PC **A04**/MF **A01**
Naval Underwater Systems Center New London CT New London Lab
Effects of Random Shadings, Phasing Errors, and Element Failures on the Beam Patterns of Linear and Planar Arrays.
Technical rept.,
Albert H. Nuttall. 14 Mar 80, 55p Rept no. NUSC-TR-6191

The moments of a sum of independent complex random variables are derived, up through fourth-order, in complete generality, with no Gaussian assumptions. Applications of these results are made to linear and planar arrays, where the beamforming is subject to random shadings, phasing errors, and element failures. Expressions for the mean and variance of the random power transfer function of the array are presented. Programs and examples of their use are given for all of these results. (Author)

AD-A082 780/8 Not available NTIS
Defence Research Establishment Atlantic Dartmouth (Nova Scotia)
A Fast Fourier Transform (FFT) Based Sonar Signal Processor,
Robert C. Trider. 14 Feb 77, 11p Rept no. DREA-77/2
Availability: Pub. in IEEE Transactions on Acoustics, Speech, and Signal Processing, vASSP-26 n1 p15-20 Feb 78 (No copies furnished by DTIC).

No abstract available.

AD-A082 801/2 PC **A04**/MF **A01**
Kaman Sciences Corp Colorado Springs CO
Noise Cancellation Transducer Development Program.
Final rept. Jan 77-May 79,
Vernon D. Peckham, and Robert T. Winnicki. 31 May 79, 74p K-79-38, DNA-5048F, AD-E300 700
Contract DNA001-77-C-0110

This report describes the development and ground testing of an acoustic sensor to detect boundary layer transition on models in high acoustic noise wind tunnel facilities. The noise cancellation transducer utilizes the Boundary Layer Acoustic Monitor (BLAM) detection concept to monitor the flow and employs a subtractive technique to cancel out coherent noise components to improve the signal to noise ratio.

SAND-79-0259 PC **A02**/MF **A01**
Sandia Labs., Albuquerque, NM.
Environmental Evaluation of Three Multi-Transceiver Ultrasonic Intrusion Detectors: Advisor VI, Contronic MD 440, and Detection Systems DS-600.
Jan 79, 19p
Contract EY-76-C-04-0789

A series of tests was performed on the Advisor VI, Contronic MD 440, and Detection Systems DS-600 multi-transceiver ultrasonic intrusion detection sensors to evaluate their performance under differing environmental conditions. The results are presented as a series of graphs which plot intruder radial velocity versus temperature. The resultant curves can be used to determine whether detector range adjustments are necessary to compensate for temperature fluctuation. (ERA citation 05:014128)

17B. Communication

AD-A082 448/2 PC **A06**/MF **A01**
MITRE Corp McLean VA
Army Communications Interoperability with NATO Nations.
Technical rept.,
William F. de Dufour. Apr 79, 103p Rept no. MTR-8016
Contract F19628-79-C-0001

This paper describes the tactical communications systems (i.e., switched, combat net radio, mobile subscriber, satellite ground terminals; and data distribution) of the major NATO countries. An appraisal of the interoperability among like systems is provided and areas wherein improvements could be made are identified. Details of the various systems are provided in appendices. (Author)

AD-A082 525/7 PC **A04**/MF **A01**
Polytechnic Inst of New York Brooklyn Microwave Research Inst
Application of Surface Acoustic Wave Devices to Communication Receivers.
Final technical rept. 1 Jul 77-30 Oct 79,
Wen-Chung Wang, Harry Schachter, and Frank A. Cassara. 14 Nov 79, 51p POLY-MRI-1403-79, AFOSR-TR-80-0250
Grant AFOSR-77-3353

This report relates to a study of acoustoelectric surface acoustic wave (SAW) devices for the detection of analog and digital communication signals. More specifically, a general SAW structure is shown to exhibit capabilities in demodulating amplitude, phase, and frequency modulated signals including those used in spread spectrum communication systems. The principle of operation for each device described is based upon acoustoelectric nonlinear interactions. The devices studied include the acoustoelectric phase-locked loop (PLL), SAW FM discriminator, differential phase shift-keyed (DPSK) demodulator, monolithic integrated SAW structures for the detection of spread spectrum communication signals, and an acoustoelectric voltage controlled oscillator (VCO). In addition, recognizing the importance of thin-film technology in fabricating monolithic integrated structures, we initiated a thin-film technology program. The capabilities and limitations of each of these devices were examined theoretically and experimentally. Theoretical models which provide physical insight into each demodulator's performance and design rules were advanced. Comparisons were made with known electronic structures. (Author)

AD-A082 609/9 PC **A05**/MF **A01**
University of Southern California Marina Del Rey Information Sciences Inst
DoD Standard Transmission Control Protocol,
Jon Postel. Jan 80, 82p
Contract DAHC15-72-C-0308

The Transmission Control Protocol (TCP) is intended for use as a highly reliable host-to-host protocol between hosts in packet-switched computer communication networks, and especially in interconnected systems of such networks. This document describes the functions to be performed by the Transmission Control Protocol, the program that implements it, and its interface to programs or users that require its services. Computer communication systems are playing an increasingly important role in military, government, and civilian environments. This document primarily focuses its attention on military computer communication requirements, especially robustness in the presence of communication unreliability and availability in the presence of congestion, but many of these problems are found in the civilian and government sector as well. As strategic and tactical computer communication networks are developed and deployed, it is essential to provide means of interconnecting them and to provide standard interprocess communication protocols which can support a broad range of applications.

AD-A082 618/0 PC **A04**/MF **A01**
Bolt Beranek and Newman Inc Cambridge MA
Combined Quarterly Technical Report Number 16. SATNET Development and Operation, Pluribus Satellite IMP Development, Remote Site Maintenance, Internet Development, Mobile Access Terminal Network.
Rept. for 1 Nov 79-31 Jan 80,
R. D. Bressler. Feb 80, 60p Rept no. BBN-4342
Contracts MDA903-76-C-0252, N00039-78-C-0405
Sponsored in part by Contract N00039-79-C-0386. Continuation of contracts DAHC15-69-C-0179, F08606-73-C-0027, F08606-75-C-0032 and MDA903-76-C-0213.

This Quarterly Technical Report describes work on the development of and experimentation with packet broadcast by satellite; on development of Pluribus Satellite IMPs; on a study of the technology of Remote Site Maintenance; on the development of Internetwork monitoring; and on shipboard satellite communications. (Author)

AD-A082 714/7 PC **A06**/MF **A01**
General Electric Co Utica NY Aerospace Electronic Systems Dept
Nonlinear System Identification Study. Part II. Computational Complexity Study.
Final technical rept. 8 Sep-21 Nov 79,
E. J. Ewen. Feb 80, 102p RADC-TR-79-199-PT-2
Contract F30602-79-C-0046
See also Part 1, AD-A081 464.

The computational complexity of a nonlinear system identification technique is evaluated in this report. The identification technique uses a black box approach requiring measurements only at system input and output terminals and is applicable to weakly nonlinear systems whose behavior is adequately characterized by a finite Volterra Series. The computational aspects of the technique are evaluated in terms of the complexity of the calculations and the complexity of the system being implemented. Techniques for reducing the order of the second order response are investigated. These techniques include restricted frequency range, integration time control, and dominant pole concepts. The class of systems to which the technique can be applied is evaluated. (Author)

AD-A082 723/8 Not available NTIS
SHAPE Technical Center the Hague (Netherlands)
Design of Chaff and Chaff-Supported Communication Systems.
Professional paper,
A. Nejat Ince, I. M. Vogt, and Horst Goessl. 23 Oct 75, 21p Rept no. STC-PP-125
Availability: Pub. in IEEE Transactions on Communications, vCOM-24 n8 p785-803 Aug 76 (No copies furnished by DTIC).

No abstract available.

AD-A082 802/0 PC **A03**/MF **A01**
Defense Communications Engineering Center Reston VA
AN/TTC-39 Switch Simulator User's Guide.
Technical note,
Horst Ulfers. Feb 80, 39p DCEC-TN-3-80, AD-E100 347

The AN/TTC-39 Switch Simulator was developed for DCA by GTE-Sylvania under contract DCA100-76-C-0068. The software was written in FORTRAN-IV for use on IBM System-360 or System-370. This manual describes the operation of the AN/TTC-39 Switch Simulation System as implemented on the DCEC Hybrid Simulation Center in Reston, VA.

AD-A082 880/6 PC **A03**/MF **A01**
Ohio Univ Athens Dept of Electrical Engineering
Application of the Foster Channel Block Monitor (FCBM) to Air/Ground Communications.
Final rept. Jun-Dec 79,
David G. Herold. Dec 79, 49p EER-42-1, FAA-R-6600.1
Contract DOT-FA79WA-4318

The Foster Channel Block Monitor (FCBM) is a device which monitors the interference level of a communications channel while the operator is transmitting. The result of this capability is to reduce co-channel transmissions which block each other. This paper describes an implementation of the FCBM concept in retro-fitting standard FAA ground-to-air communications equipment. No function of the communications equipment is lost due to the addition of the FCBM capability. The sensitivity of the receiver remains unchanged. This paper also describes the in-band and out-of-band interference of the unit and shows that these are below that required by the FCC Rules and Regulations. The unit performed accurately in bench tests. The operator is alerted to the presence of an interfering signal and given an indication of the level of the signal by lights on the control panel. (Author)

AD-A082 948/1 PC **A02**/MF **A01**
Massachusetts Inst of Tech Cambridge Research Lab of Electronics
Enhancement and Bandwidth Compression of Noisy Speech,
Jae S. Lim, and Alan V. Oppenheim. 22 Jun 79, 23p
Contracts N00014-75-C-0951, F19628-78-C-0002
Pub. in Proceedings of the IEEE, v67 n12 p1586-1604 Dec 79.

No abstract available.

AD-A082 956/4 PC **A24**/MF **A01**
General Dynamics San Diego CA Electronics Div
Multifunction Multiband Airborne Radio System MFBARS.
Interim technical rept. 27 Mar-30 Sep 78 on Phase 1.
Oct 78, 553p Rept no. R-78-055
Contract F33615-78-C-1517

This interim report describes the work performed from 27 March to 30 September 1978 on Phase I of Contract F33615-78-C-1517, Multifunction-Multiband Airborne Radio System (MFBARS) Study. The objective of Phase I of the study is to define a wide range of alternative Communication, Navigation and Identification (CNI) architectures, to develop an approach for economic comparison of architectures, to establish criteria for selecting among the alternatives based on a set of requirements furnished by the government and to recommend a specific approach or approaches to be detailed further in the second phase of the study. The first step in performing the study consisted of reviewing and analyzing the results of previous studies related to CNI integration. This analysis in combination with information and direction from AFAL resulted in an assessment degree of time-sharing and pulse interleaving possible for the MFBARS resources such as antennas, transmitter power amplifier, IF amplifiers and signal processor channels. It also resulted in the establishment of a set of guidelines and ground rules that were used in the performance of the rest of the study tasks. Next several different overall architectures were developed. One of these architectures was a totally non-integrated configuration consisting of a set of separate equipment units, one for each CNI function (HF, VHF AM, VHF FM, UHF, JTIDS, IFF, TACAN, GPS, etc.). The units were assumed to be a next generation development beyond the current developed version of the equivalent unit.

AD-A083 027/3 PC **A02**/MF **A01**
National Aviation Facilities Experimental Center Atlantic City NJ
Radar Microwave Link (RML) Electromagnetic Compatibility Measurements.
Final rept. Feb-Jul 79,
James G. Dong. Mar 80, 22p FAA-NA-80-2, FAA-RD-80-15

Tests were accomplished on two different Microwave Relay Transmitter and Receiver combinations operating in the frequency ranges of 7.125 to 8.4 GHz and 14.4 to 15.25 GHz. Measurements to determine interference characteristics included: receiver off-channel rejection, receiver intermodulation, transmitter spectrums, transmitter intermodulation, and second harmonics. Based on the test results, the adjacent frequency spacing should be at least 20 MHz and 50 MHz for RML-4 and Terra-Com equipment, respectively. Additional measurements are recommended on new equipment in the 14.4 to 15.25 GHz range for valid criteria for the handbok in preparation. (Author)

PAT-APPL-6-115 860 PC **A02**/MF **A01**
Department of the Navy Washington DC
Multirate Digital Voice Communication Processor.
Patent Application,
George S. Kang, Lawrence J. Fransen, and Evans L. Kline. Filed 28 Jan 80, 23p AD-D007 141/5
Availability: This Government-owned invention available for U.S. licensing, and possibly, for foreign licensing. Copy of application available NTIS.

This document discloses a digital voice processor for transmitting and receiving encoded speech, and, if applicable, encrypted encoded speech, at a high data-rate and a low data-rate, and providing interoperability between high- and low-data-rate modes without any intermediate decoding and encoding of the data stream, includes a wideband ex-

citation signal encoder at the transmitter and a wideband excitation signal decoder at the receiver for digitizing the prediction residual waveform component of speech such that the data being transmitted at the high data-rate includes the data being transmitted at the low data-rate as a subset. The low data-rate is 2.4 kilobits per second (kbps) for transmitting over narrowband channels. The high data-rate is 9.6 kbps for transmitting over wideband channels. A digital data stream comprising a set of 216 bits per time frame is produced at the transmitter. The data stream represents voice encoded at 9.6 kbps and also includes voice encoded at 2.4 kbps as a subset. The 9.6 kbps can be converted to 2.4 kbps by deleting 162 bits. The 2.4 kbps can be converted back to 9.6 kbps by inserting 162 bits. The rate conversion may be made anywhere within the communication link while maintaining both a signal quality that is not less than that of the low data-rate, and end-to-end security of the voice communications. (Author)

PAT-APPL-6-129 779 PC **A02**/MF **A01**
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.
Memory-Based Frame Synchronizer.
Patent Application,
J. K. Niswander, and R. J. Stattel. Filed 12 Mar 80, 23p N80-20453/0, NASA-CASE-GSC-12430-1
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

The memory frame synchronizer is comprised of a serial to parallel converter to convert a serial input data stream to a constantly changing parallel data output. This provides a data format which can be easily and dynamically changed. The process is accomplished using programmable memory arrays to perform the functions of the sync word recognizer and of the counter decoding logic. The parallel data output is supplied to programmable sync word recognizers each consisting of multiplexer and random access memory (RAM). The multiplexer is connected to both the parallel data output and an address bus. The RAM is used as an associative memory or decoder and is programmed with the pattern of binary 1's and 0's necessary to identify a specific sync word.

PATENT-4 189 675 Not available NTIS
National Aeronautics and Space Administration. Pasadena Office, CA.
Satellite Personal Communications System.
Patent,
N. B. Reilly, and J. G. Smith. Filed 30 May 78, patented 19 Feb 80, 9p N80-20448/0, PAT-APPL-910 707, NASA-CASE-NPO-14480-1
Supersedes PAT-APPL-910 707-78, N78-25275 (6 -16, p 2101). Sponsored by NASA.
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC. 20231 $0.50.

Voice channel communication between low power mobile stations dispersed over a large area is provided by a system which includes a geostationary satellite utilizing a large UHF antenna that can receive a transmission from a caller and retransmit it over any one beam of a matrix of narrow beams, so the chosen beam covers an area in which a designated called party is located. A single up-link control channel occupying a narrow frequency band, can be utilized to receive dial up signals from a caller, and another single down link control channel can be utilized to ring up the called party located anywhere within the continental United States. The satellite antenna includes a matrix of feed horns that not only direct the beams in a controlled matrix onto the area of the continental United States, but also permit detection of the region from which the caller's signal is transmitted and the region from which the called party's answer is received, to enable the interconnection of signals received from these two regions. The system is particularly useful for rural areas.

PB80-101082 PC **E11**/MF **A01**
National Technical Inst. for the Deaf, Rochester, NY.
Communication Performance Evaluation with Deaf Students: A Review.
Final rept.,
Donald D. Johnson. 14 Oct 79, 391p NTID/TAP/EE-80/0100
Sponsored in part by Department of Health, Education, and Welfare, Washington, DC.

The reviews contained within this manual were conducted as a direct result of the recommendations of a special task force selected by participants at a national planning workshop (July 25 and 26, 1977) for a Communication Performance Profile Extension Project. The goal of this project is the identification and development of test instruments to assess the general receptive and expressive communication skill levels of deaf students between the chronological ages of five years through adulthood. As Phase 2 of the project, the reviews in this manual represent the culmination of an effort to search for existing communication evaluation instruments which meet the criteria developed by the task force for inclusion within such a battery of tests. Each review includes a set of recommendations for achieving phases 3 and 4 of this project.

PB80-164429 PC **A09**/MF **A01**
Federal Communications Commission, Washington, DC. Office of Plans and Policy.
Appendices to Final Report of the UHF Task Force,
Raymond M. Wilmotte. 1979, 195p
See also Final report, PB80-164437.

Contents:
- Interaction of decision makers, analysts, and old hands in decision making;
- Overview of report on speech bandwidth reduction;
- Emergence of compandored single sideband;
- Introduction of marketplace forces for the development of spectrum efficiency;
- Spectrum requirements for civil maritime and aeronautical services;
- Prospects of television bandwidth reduction;
- Determining preferences for UHF allocations, an outline of statistical procedures.

PB80-164437 PC **A04**/MF **A01**
Federal Communications Commission, Washington, DC. Office of Plans and Policy.
Final Report of the UHF Task Force,
Raymond M. Wilmotte. Sep 79, 54p
See also Appendices, PB80-164429.

The Task Force focused its attention on the four major services in the band--television, civil maritime, civil aeronautics and land mobile. Its plan was to estimate the expected demand to the end of the century and the spectrum space that each would require to meet this demand as well as that of new services likely to emerge. The capacity of the communication system would depend on the development of spectrum saving procedures and technology. Just as important and just as difficult would be the means for their introduction into the national telecommunication system. Whatever process was developed, it would have to be flexible to meet unexpected fluctuations and have some leeway to grow in the first few years of the next century.

PB80-164684 PC **A05**/MF **A01**
National Telecommunications and Information Administration, Boulder, CO. Inst. for Telecommunication Sciences.
Three Phases of Teletraffic Congestion in Military Access Areas,
M. Nesenbergs, and R. F. Linfield. Feb 80, 80p NTIA/REPORT-80-34
Sponsored in part by Army Communications Systems Agency, Fort Monmouth, NJ. See also report dated Sep 79, PB80-126139.

In military base access areas, akin to many commercial installations, the telecommunications traffic passes through several concentration and switching stages. Loads to server facilities are formed through mergers and branch outs of offered traffic substreams. Blocking of calls is known to occur in many ways throughout the existing access area networks. In this report, an effort is made to represent the access area grades of service (i.e., the probabilities of blocking for different substreams) in more realistic ways than before. The message flow process is structured into three representative contention phases. The three phases are realistic and occur often in military networks. All three phases apparently possess queueing models and analytical properties distinct from the conventional Engset, Erlang, and other classical models. Their blocking probabilities also differ significantly. One of the three models appears tractable only through bounds and asymptotically tight approximations. The other two models are shown to permit formal solutions. Given an access area network, the three blocking probabilities may be applied individually or in a variety of combinations. The paper demonstrates several applications to access area telephony.

PB80-169881 PC **A04**/MF **A01**
MITRE Corp., McLean, VA. METREK Div.
Development of an Experimental Spread Spectrum Maritime Communication System: Phase I.
Technical rept.,
Walter C. Scales. Jul 79, 75p MTR-79W00217, MA-RD-940-80005
Contract D0-A01-78-3108

This report summarizes the results of the first phase of an investigation of a spread spectrum technique for maritime applications. Potential applications include distress signaling via satellite, remote monitoring of ship performance, and 'orderwire' signaling for future maritime satellite communication systems. The specific approach developed under this contract provides for low power, low data rate transmission through a maritime communications satellite. The receiver designed for this application uses a matched filter based on charge transfer devices. A baseband receiver was demonstrated during the first project phase. The second phase, which is now approaching completion, will encompass extension of the hardware to an intermediate frequency and testing via satellite.

SAND-79-1380 PC **A08**/MF **A01**
Sandia Labs., Albuquerque, NM.
Study of High-Altitude Radar Altimeter Model Accuracy and SITAN Performance Using HAAFT Data.
T. C. Shieves, and M. W. Callahan. Jul 79, 161p
Contract EY-76-C-04-0789

Radar altimetry data, inertial navigation data, and scoring data were collected under the HAAFT program by Martin Marietta Corporation for the United States Air Force over several areas in the western United States at altitudes ranging from 3 to 20 km. The study reported here uses the HAAFT data in conjunction with Defense Mapping Agency (DMA) topographic data to evaluate the accuracy of a high-altitude pulsed-radar altimeter model and the resulting performance of the terrain-aided guidance concept SITAN. Previous SITAN flight tests at low altitudes (less than 1500 m AGL) have demonstrated 6-20 m CEP. The high-altitude flight test data analyzed herein show a SITAN CEP of 120 m. The radar altimeter model was required to achieve this performance includes the effects of the internal track loop, AGC loop, antenna beamwidth, and the terrain radar cross section and provided a factor of 6 improvement over simple nadir ground clearance for rough terrain. It is postulated that high-altitude CEP could be reduced to 50 m or less if an altimeter were designed specifically for high-altitude terrain sensing. (ERA citation 05:012388)

17D. Electromagnetic and Acoustic Countermeasures

AD-A083 008/3 PC **A02**/MF **A01**
Naval Ocean Systems Center San Diego CA
Life Cycle Cost Estimates of the AN/WLR-1G, AN/SLQ-32(V)2, and Conceptual ESM System.
Research and development rept. Jun-Sep 79,
E. L. Welker, and J. Valenzuela. Sep 79, 25p
Rept no. NOSC/TR-500

A life cycle cost estimate is made for each of three shipboard ESM systems. One is an older equipment, the AW/WLR-1 and its ancillary items. The second is the currently evolving AN/SLQ-32. A newly conceived NOSC architecture is the basis for the third system. Material is presented that augments the cost data with the conditions under which it applies. (Author)

17E. Infrared and Ultraviolet Detection

AD-A082 429/2 PC **A02**/MF **A01**
Riverside Research Inst El Segundo CA
Satellite Infrared (SIRE) Sensor Data Processing Perspective and Definition. Volume III. Appendix B. Comments on the SIRE Ground Segment Specification. Appendix C. Comments on the Hughes SIRE Ground Segment Concept and System Description Document.
Final rept. Apr-Dec 78,
Ronald G. Cestaro. 31 Dec 78, 20p RRI-F/387-7-55-VOL-3, SD-TR-79-23-VOL-3
Contract F04701-76-C-0258
See also Volume 1, AD-A082 427.

As a consequence of its extensive background in infrared technology and data processing of experimental measurements, Riverside Research Institute was selected by the Air Force's Space and Missile Systems Organization to provide a data processing perspective to the development of the Satellite Infrared (SIRE) Sensor, and establish requirements for the SIRE data processing and the system and operations for that processing. In this volume, the appendices document the detailed comments resulting from RRI's review of Hughes Aircraft Company's 'SIRE Ground Segment Specifications' and 'SIRE Ground Segment Concept and System Description' documents.

AD-A082 727/9 PC **A03**/MF **A01**
Massachusetts Inst of Tech Lexington Lincoln Lab
IRAR Image Processing Techniques.
Project rept.,
Dorothy R. Sullivan. 7 Nov 79, 44p TST-41, ESD-TR-79-271
Contract F19628-80-C-0002
Original contains color plates: All DTIC and NTIS reproductions will be in black and white.

This report examines the problems associated with the display of active (10.6 micron) infrared radar images. Issues addressed include degradations introduced by the imaging sensor, the effects of these degradations on image tracking and image enhancement, and evaluation of various tracking and enhancement techniques in view of their usefulness and potential hardware implementation. The performance of each algorithm is demonstrated using either simulated data or data collected by the Infrared Airborne Radar (IRAR) testbed system. (Author)

PAT-APPL-6-118 384 PC **A02**/MF **A01**
Department of the Air Force Washington DC
Modular Multilayer Detector.
Patent Application,
John M. Tracy. Filed 5 Feb 80, 11p AD-D007 136/5
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

This document discloses infrared detector arrays which have focal plane processing in modular form mounted on stacked boards, where the processing integrated circuits are recessed in adjacent boards. (Author)

17F. Magnetic Detection

AD-A082 833/5 PC **A05**/MF **A01**
National Research Council of Canada Ottawa (Ontario) Div of Mechanical Engineering
Quarterly Bulletin of the Division of Mechanical Engineering and the National Aeronautical Establishment, Ottawa, 1 October to 31 December 1979.
1979, 88p Rept no. DME/NAE-1979(4)
Foreword in French.

Contents: NAE Convair 580 Aeromagnetics Program; Urban Traffic Signal Control for Fuel Economy; and Current Projects of the Division of Mechanical Engineering and the National Aeronautical Establishment.

17G. Navigation and Guidance

AD-A082 471/4 PC **A04**/MF **A01**
Federal Aviation Administration Washington DC Systems Research and Development Service
Engineering and Development Program Plan - En Route Control - Program 12.
Nov 79, 58p Rept no. FAA-ED-12-2B
Supersedes report dated Feb 75, AD-A007 623.

Implementation of the Third Generation En Route ATC System, Model A3d2, provides basic automation capability for processing flight data and surveillance functions. Substantial upgrading of this basic capability is needed to meet the demand forecast for the en route system through the 1980's. This document describes the development plan to build the features and functions necessary for upgrading the present Third Generation En Route System. Program objectives, development activities, implementation considerations, and resource estimates are set forth.

AD-A082 487/0 PC **A05**/MF **A01**
Megatek Corp San Diego CA
OMEGA Japan Antenna System: Modification and Validation Tests. Volume 1. Report Proper.
Final rept. Oct-Nov 78,
J. C. Hanselman. 15 Oct 79, 100p NOSC-TR-492-VOL-1
Contract N00123-78-C-0043
See also Volume 2, AD-A082 488.

Electronic measurements were performed on the OMEGA Japan antenna system during October-November 1978. The work was performed by Megatek Corporation under contract and by NOSC under Project MP01538B10. The electrical height of the antenna is 210 metres for all frequencies. The station will be able to radiate 10 kW with antenna currents of 360 amperes at 10.2 kHz to 270 amperes at 13.6k Hz. Recommendations are made regarding the gear ratios to use with the variometers. (Author)

AD-A082 488/8 PC **A04**/MF **A01**
Megatek Corp San Diego CA
OMEGA Japan Antenna System: Modification and Validation Tests. Volume 2. Data Sheets.
Final rept. Oct-Nov 78,
J. C. Hanselman. 15 Oct 79, 69p NOSC-TR-492-VOL-2
Contract N00123-78-C-0043
See also Volume 1, AD-A082 487.

For abstract see AD-A082 487.

AD-A082 494/6 PC **A13**/MF **A01**
Air Force Avionics Lab Wright-Patterson AFB OH
Gravity Model Evaluation for Precise Terrestrial Inertial Navigation: A System Accuracy Approach.
Final rept. 17 Dec 76-15 Dec 79,
Robert M. Edwards. Dec 79, 285p Rept no. AFAL-TR-79-1231
Doctoral thesis.

Inertial navigation has evolved to the point that the traditional gravity model is a principle error source in precise systems. Since future systems may require a more accurate gravity model, a statistical performance evaluation is needed to compare candidate models on realistic scenarios. The present methods of model evaluation are Monte Carlo, which is computationally costly, and linear state space covariance analysis, which has troublesome trajectory and statistical model restrictions. This research developed a new statistical analysis technique based on a double integral expression of the navigation system error covariance. Numerical algorithms were formulated to approximate the covariance, and the accuracy and efficiency of these algorithms were compared using a simple Schuler Loop example analysis. (Author)

AD-A082 509/1 PC **A04**/MF **A01**
Army Missile Command Redstone Arsenal AL Advanced Sensors Directorate
Active/Passive Long Wavelength Infrared (LWIR) Laser Guidance.
Technical rept.,
M. D. Blue, and G. R. Loefer. 31 Jul 79, 51p
Rept no. DRSMI-RE-CR-80-1

A technical assessment has been made of the opportunities for the use of two or more wavelengths, or of passive and active optical systems, acting in combination for the purpose of missile guidance and target acquisition. In addition, considerations relative to the choice of waveband and current state-of-the-art in components and signal processing are related to requirements for guidance systems. Adverse environments and fire-and-forget capability are emphasized. Most dual wavelength systems described in the literature are of little value for the missile guidance and target acquisition problem where the target is likely to be imbedded in strong clutter. The combination of and active and passive system does offer a unique combination of advantages in contrast to other combinations of active-active and passive-passive systems. The characteristics of an active-passive systems operating in the 8-14 micrometer wavelength region are discussed. The desirability of this wavelength region and the favorable status of component technology for the wavelength region make this an attractive alternative for seekers or trackers for missile guidance. The study also shows the strong need for more data on active signatures for both targets and clutter. (Author)

AD-A082 533/1 PC **A05**/MF **A01**
Stanford Univ CA Edward L Ginzton Lab
New Approaches to Optical Systems for Inertial Rotation Sensing.
Final rept. 1 Oct 78-30 Sep 79,
G. Paviath, H. J. Shaw, and M. Chodorow. 1980, 80p GL-3094, AFOSR-TR-80-0235
Grant AFOSR-76-3070

The objective of the program is to determine the potential of new fiber optic approaches to inertial rotation sensing. The system presently under investigation is a passive reentrant Sagnac system (PRS) in which light pulses from an external laser, propagating clockwise and counterclockwise around a multiturn sensing loop of single-mode optical fiber, are repetitively recirculated around the multiturn loop a multiplicity of times to increase the sensitivity of the system to inertial rotation. It is shown experimentally that five recirculations around a loop consisting of 600 meters of single mode fiber are possible using bulk optical components of standard precision, with behavior in accordance with theory. This has potential application to small rate-gyros. Work is proceeding on an all-fiber integrated version of the PRS system, which will circumvent serious optical alignment problems encountered with bulk components, and is designed to greatly increase performance as well as reducing size, weight and cost. An optical fiber amplifier being developed under a companion program will be introduced later into this system, to compensate for fiber propagation losses, forming an active reentrant Sagnac system (ARS), designed to permit a very large number of recirculations, forming an integrating-rate-gyro with potential for extreme sensitivity. (Author)

AD-A082 535/6 PC **A12**/MF **A01**
Stanford Univ CA Guidance and Control Lab
Modeling and Error Analysis of a Superconducting Gravity Gradiometer.
Final rept.,
Kai Yuen Wang. Aug 79, 268p AFOSR-TR-80-0219
Grant AFOSR-76-2913

The demand for higher accuracy in inertial navigation systems has pushed the development of more accurate accelerometers and gyroscopes. Inertial navigation systems (INS) can now be built with error stemming mainly from the uncertainty of the vertical along the flight path (Savet, 1970). The deflection of the vertical is produced by mass anomalies on the surface of the earth. The error can be corrected by measuring the gravity gradient and using it in the navigation equations. This possibility has generated intensive interest and research in the field of gravity gradiometry. The lower bound of the resolution of room temperature gravity gradiometers is thermal (Brownian) noise. By lowering the temperature to 4 K, the noise level is smaller by an order of magnitude. A comparatively simple gravity gradiometer can be built using some newly developed superconducting technology. (Author)

AD-A082 628/9 PC **A03**/MF **A01**
MITRE Corp McLean VA METREK Div
Preliminary Computer Sizing Estimates for Automated En Route ATC (AERA),
H. Gilbert Miller. Oct 79, 39p MTR-79W00263, FAA-EM-79-21
Contract DOT-FA80WA-4370

The Federal Aviation Administration is presently analyzing requirements for the computer system that will replace the IBM Model 9020 computers, that currently support the en route NAS system, as well as the computers that support the terminal ARTS facilities. As an early input to the requirements analysis effort, the FAA's Office of System Engineering Management requested a preliminary analysis of computer loads imposed by near-term enhancements to the existing NAS and certain long-term enhancements. This report presents an analysis that estimates the computer sizing requirements imposed by the Automated En Route Air Traffic Control (AERA) system, a possible long-term enhancement to NAS. In order to establish preliminary AERA processor and memory requirements, two models are presented. A simulation model of the higher level AERA functions, such as initial processing and progress monitoring, is applied to the Washington Center to show typical AERA imposed processor loading. A previously developed linear model of required memory is also applied to show typical memory requirements resulting from AERA. The models presented reflect a version of AERA existing during December, 1978. That version of AERA did not include the recently developed concepts of strategic and tactical planning/control. Additionally, since AERA will continue to evolve during the development stage, requirements enumerated must be considered preliminary in nature and significant changes on the estimates may be expected. Throughout this analysis, it is assumed that there is no integration of the existing NAS functions and the AERA functions.

AD-A082 683/4 PC **A06**/MF **A01**
MegaTek Corp San Diego CA
OMEGA La Reunion Antenna System: Modification and Validation Tests. Volume 1. Report Proper.
Final rept.,
J. C. Hanselman. 10 Jul 79, 104p NOSC-TR-484-VOL-1
Contract N00123-78-C-0043
See also Volume 2, AD-A082 684.

Electronic measurements were performed on the La Reunion Omega Antenna System during the month of August 1978. The work was performed under NOSC project MP01538B10, with Megatek Corporation as contractor. The necessary connections to the antenna helix tuning coil were completed so that the station can now operate on 11.050 kHz. The total antenna system resistance was measured and found to compare favorably with original measurements made in 1975. An analysis was made of optimum gear ratios to use with the variometers used to keep the antenna system tuned. The electrical height of the antenna was found to be 163 metres for 10.2 kHz and to increase slightly with frequency to 170 metres at 13.6 kHz. The antenna system efficiency varies with frequency from 8% to 13.8%. The station can easily radiate the designed 10 kW power. (Author)

AD-A082 684/2 PC **A06**/MF **A01**
MegaTek Corp San Diego CA
OMEGA La Reunion Antenna System: Modification and Validation Tests. Volume 2. Data Sheets.
Final rept.,
J. C. Hanselman. 10 Jul 79, 108p NOSC-TR-484-VOL-2
Contract N00123-78-C-0043
See also Volume 1, AD-A082 683.

Contents: Apparent Capacitance, Antenna System Resistance, Radio Field Intensity - antenna Current, Radio Field Intensity - Site Location, Radio Field Intensity - Measurements, and Radio Field Intensity - Calculations.

AD-A082 717/0 PC **A04**/MF **A01**
Coast Guard Washington DC Office of Research and Development
USCG/MARAD Static Tests of the GPS Navigation Set-Z (Low Cost).
Final rept. on Phase 1,
Walter N. Dean, and Donald A. Feldman. Mar 80, 65p Rept no. USCG-D-18-80

One of six Type Z Navigation sets, which use the C/A code signal that will be available to civil users, was provided the U.S. Coast Guard and Maritime Administration for a joint test and evaluation program. The goal of these tests is to determine the suitability of this form of GPS for civil marine use. The first static tests were conducted in May-September 1979 in Long Beach, California. Following a tutorial summary of the Z-set operating principles, results from these tests are presented. When signal conditions are optimum, they reveal a four-satellite fix accuracy and variability which was considerably better than the set's readout precision of 1.0 arc-second. Underlying effective ranging errors were estimated to fall in the 5-10 meter, rms, range. Fix errors increased by a factor of five when 24-hour old orbit and clock parameters were used, and they increased the same amount when only three satellites were available with poor GDOP. The set exhibited no failures during the tests, and satisfactory operator I/O. Fixes obtained in a vehicle agreed with topographic map location at 14 of 15 sites around Los Angeles, with the one fix failure ascribed to building shadow. (Author)

AD-A082 731/1 PC **A07**/MF **A01**
Performance Measurement Associates Inc Vienna VA
Data Analysis Methodology for Day/Night Inflight Tactical Navigation.
Final rept. 8 Aug 77-19 Mar 79,
Edward M. Connelly, and Robert F. Comeau. Sep 79, 127p PMA-7-79, ARI-TR-411
Contract DAHC19-77-C-0042

Low-level helicopter navigation, both at night and during the day, is an essential portion of the Army's mission. Navigation performance, defined as the probability of navigating along a prescribed route or route segment without deviation, is a function of many factors including map type, terrain type, and time of day. Determining the effects of these factors is important for predicting performance of Army navigators, identifying factors critical to navigation, evaluating the probability of navigation success along a route, and developing training aids. The research reported here analyzed low-level flight experiment data to develop that information. This report contains results of the analyses of helicopter low-level navigation data, (a) to determine the probability of navigation success along a route as a function of terrain type, (b) to develop a means of determining route difficulty, and (c) to develop a method of scoring student performance. The FORTRAN computer programs and the navigation data base used in the analysis are also documented. (Author)

AD-A082 764/2 PC **A07**/MF **A01**
MITRE Corp McLean VA METREK Div
NAFEC Air Traffic Control (ATC) Facilities Planning: Current Capabilities and Requirements for Long-Term Development.
Final rept. Jan 79-Jan 80,
David J. Sweeney, Ralph A. Amato, and Haim S. Gabrieli. Feb 80, 131p MTR-80N00001, FAA-NA-80-160
Contract DOT-FA79NA-6013

This report presents the results of existing Air Traffic Control (ATC) test and support facilities at the National Aviation Facilities Experimental Center (NAFEC) in Atlantic City, NJ, and an analysis assessing the impact of future programs on these facilities and their operations. The report identifies basic facility enhancements to apply when the facilities are relocated to the new NAFEC Technical and Administrative Complex. The impact of long-term development and operational support programs is described, and requirements for facility development and planning to support these programs are discussed. (Author)

AD-A082 797/2 PC **A02**/MF **A01**
Naval Research Lab Washington DC
Stability Analysis of the Cesium Frequency Standard on Board Navigation Technology Satellite 2 (NTS-2).
Interim rept.,
Thomas McCaskill, James Buisson, Joseph White, and Sarah Stebbins. 4 Feb 80, 16p NRL-8375, AD-E000 385

NTS-2 was successfully launched on June 23, 1977, and maneuvered into a preassigned constellation position as part of the Phase I demonstration for NAVSTAR GPS. NTS-2 carried two cesium frequency standards. Precise timing signals, derived from one of the cesium frequency standards, were continuously transmitted. Time differences were then measured by the NTS ground stations. The NTS-2 time differences were used to fit an orbit to the observations over a (typical) 6-day span. Clock offsets were then obtained using the reference orbit and other measured parameters; these clock offsets were then used to estimate the cesium frequency stability. Estimates of frequency stability have been obtained for one of the two cesium frequency standards for sample times of from 1 to 9 days. Analysis of the results indicates a white frequency noise of 0.00000000011 divided by the square root of the sample time in days for sample times of 1 to 5 days with a flicker floor of 0.00000000000017 for sample times from 5 to 9 days. For sample times of 10 days or longer an attempt was made to check for cesium aging with respect to the Universal Time Coordinated of Master Clock 1 at the United States Naval Observatory. The value for aging was not significantly different from zero; that is, no cesium aging was found.

AD-A082 892/1 PC **A06**/MF **A01**
Rockwell International El Segundo CA North American Aircraft Div
Study of Universal Alignment Equipment. Revised.
Final rept. Sep 79-Feb 80,
Arlo Wehmeyer, Melvin Broder, and Thomas Brady. 2 Apr 80, 124p Rept no. NA-80-12
Contract F33657-79-C-0783
Revision of report dated 19 Feb 80.

A study of was made universal installation alignment instruments for aircraft and missiles. The instruments consist of electronic level sensors and gyros to transfer alignment from a master reference plate in the aircraft to the mounts which are to be aligned. Instrument requirements are defined as well as mount requirements to avoid the need for adapters or other equipment. A technology survey, applications study, and cost-effectiveness data are presented. (Author)

AD-A082 957/2 PC **A02**/MF **A01**
Advisory Group for Aerospace Research and Development Neuilly-sur-Seine (France)
The Impact of Global Positioning System on Guidance and Controls Systems Design of Military Aircraft. Volume IID. Specific Study Number 4: Gyro Accuracy Requirements in a Strap Down Inertial Navigation System with GPS Aiding for RPV Missions.
Advisory rept.,
K. Hurrass, and H. Winter. Feb 80, 17p Rept no. AGARD-AR-147-VOL-2D
See also Volume 1, AD-A076 196.

The objectives of the Guidance and Control Panel Working Group 04 were to consider the integration of GPS in aircraft systems and make recommendations for implementation. Volume IID addresses the fourth of those specific studies. The availability of the NAVSTAR/GPS opens the way to the use of simpler gyros in a strap-downs system. The influence of GPS aiding of a strap-down system on the accuracy requirements for the gyros is investigated in this paper for RPV mission.

N80-20250/0 PC **A07**/MF **A01**
Ohio Univ., Athens. Avionics Engineering Center.
Analysis of First and Second Order Binary Quantized Digital Phase-Locked Loops for Ideal and White Gaussian Noise Inputs.
P. R. Blasche. 31 Mar 80, 127p NASA-CR-162841, TM-75
Contract NGR-36-009-017

Specific configurations of first and second order all digital phase-locked loops are analyzed for both ideal and additive white Gaussian noise inputs. In addition, a design for a hardware digital phase-locked loop capable of either first or second order operation is presented along with appropriate experimental data obtained from testing of the hardware loop. All parameters chosen for the analysis and the design of the digital phase-locked loop are consistent with an application to an Omega navigation receiver although neither the analysis nor the design are limited to this application.

N80-20251/8 PC **A02**/MF **A01**
National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.

Simulation of a Navigator Algorithm for a Low-Cost Gps Receiver.
W. F. Hodge. Feb 80, 23p NASA-TM-81778

The analytical structure of an existing navigator algorithm for a low cost global positioning system receiver is described in detail to facilitate its implementation on in-house digital computers and real-time simulators. The material presented includes a simulation of GPS pseudorange measurements, based on a two-body representation of the NAVSTAR spacecraft orbits, and a four component model of the receiver bias errors. A simpler test for loss of pseudorange measurements due to spacecraft shielding is also noted.

PAT-APPL-6-129 783 PC **A02**/MF **A01**
National Aeronautics and Space Administration. Hugh L. Dryden Flight Research Center, Edwards, CA.
Improved Sun-Sensing Guidance System for High-Altitude Aircraft.
Patent Application,
R. D. Reed. Filed 12 Mar 80, 17p N80-20249/2, NASA-CASE-FRC-11052-1
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A Sun sensing guidance system for high altitude aircraft is described. The system is characterized by a disk shaped body mounted for rotation aboard the aircraft in exposed relation to solar radiation and has a plurality of mutually isolated chambers. The photosensors are arranged in facing relation with the chamber openings for receiving incident solar radiation and responsively providing a voltage output. The photosensors are connected in a paired relation through a bridge circuit for providing heading error signals in response to detected imbalances in intensities of solar radiation incident on the photosensors of either pair of photosensors until a nulled relationship is achieved for the disk to the source of radiation.

PAT-APPL-6-133 769 PC **A02**/MF **A01**
Department of the Air Force Washington DC
All-Flexure Linear Isolation/Suspension System.
Patent Application,
Paul C. Kiunke. Filed 25 Mar 80, 11p AD-D007 123/3
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

This document discloses an all-flexure linear isolation/suspension system for use with a movable structure (such as an optical tracker) which is connected to a fixed structure which, in turn, is subject to a considerable variety of different forces acting upon it. The structure of the system, and its connection to the movable structure and to the fixed structure, are such that the system prevents the transmittal of any rotational force from the fixed structure to the movable structure, and limits the motion of the movable structure (with respect to the fixed structure) to linear motion along three axes that are mutually orthogonal. (Author)

PATENT-4 181 851 Not available NTIS
Department of the Army Washington DC
Automatic Astroposition Determination Apparatus.
Patent,
William A. Allen, and Pi-Fuay Chen. Filed 24 Feb 78, patented 1 Jan 80, 7p AD-D007 089/6, PAT-APPL-880 734
Supersedes PAT-APPL-880 734-78, AD-D005 123.
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

This invention relates to An automatic astroposition determination apparatus for performing measurements with improved precision and accuracy. A rectangular photosensor array is mounted in the focal plane of a theodolite and as the image of a star moves across the sensor array, a display of the image position and the time elapsed since the commencement of tracking is provided. Circuitry is provided to ensure that the leading edge of the star image on the array is tracked irrespective of how many photosensor elements the image overlies and irrespective of the direction of image transit on the array. (Author)

17H. Optical Detection

AD-A082 520/8 PC **A03**/MF **A01**
Naval Air Development Center Warminster PA Communication Navigation Technology Directorate
Performance of Industrial TV Cameras in the Navy Physical Security Program.
Final rept.,
Henry J. Hayes, and Theodore J. Boyce. 1980, 26p Rept no. NADC-80010-40

A summary of technical work resulting from the purchase and maintenance of TV cameras for Navy Physical Security use. The camera image conversion requirements deemed necessary for the application are stated in the procurement specification. The image analysis incoming inspection tests that were developed to monitor performance of production cameras are discussed. Technical improvements resulting from this work and the performance deficiencies still encountered give an overview of industrial TV cameras used in a demanding application. (Author)

17I. Radar Detection

AD-A082 550/5 PC **A06**/MF **A01**
Technology Service Corp Silver Spring MD
Detection Performance Simulation of a Dicke-Type CFAR in Distributed Clutter.
Technical rept.,
J. N. Bucknam. 22 Feb 80, 125p Rept no. TSC-W7-78
Contracts N60921-79-C-A306, N00024-78-C-7065

A Dicke-type CFAR processor is one which hard limits the radar IF or bipolar video signal prior to pulse compression. The constant false alarm rate (CFAR) properties of this processor in white receiver noise are well known. When the background against which targets must be detected is due to clutter returns, this CFAR property is destroyed. This report summarizes results of computer simulation of a Dicke-type CFAR in a background consisting of distributed clutter returns. Clutter model parameters are chosen to approximate the statistics of sea, rain, and land clutter. The simulations show the increase in probability of false alarm (PFA) in these backgrounds when the threshold settings are chosen to provide the desired PFA in receiver noise. In addition, the probability of target detection as a function of signal-to-background ratio is determined. Values are determined for the coefficients in a parametric representation of these results.

AD-A082 567/9 PC **A05**/MF **A01**
ITT Gilfillan Van Nuys CA
Commutating Feed Assembly.
Interim rept. Dec 78-Jul 79,
Ron Wolfson. Dec 79, 86p RADC-TR-79-303
Contract F19628-79-C-0034

This Interim Report covers the development to date of a low-inertia commutating feed for azimuth steering the beam of a circular array. In addition to superior electrical performance over that of an electronic system, the commutator offers improvements in reliability and life-cycle cost (LCC). It can be accessibly located where maintenance actions are more easily carried out than in an electronically-scanned system or a conventional rotating antenna. Non-contacting loop couplers achieve low-loss transfer and distribution of RF energy, with precise control of amplitude and phase that is needed to realize low sidelobe levels. This method of coupling is preferable to the capacitive coupling used in existing electromechanical commutating feeds, where illumination flutter results in unacceptable MTI performance. To obtain multiple beam groups in elevation, two or more commutators may be stacked on a common drive shaft.

AD-A082 750/1 PC **A04**/MF **A01**
National Aviation Facilities Experimental Center Atlantic City NJ
Design of an Improved Weather Contouring Device.
Final rept. Nov 77-Sep 78,
Robert G. Oliver. Mar 80, 71p FAA-NA-79-39, FAA-RD-80-6

A prototype weather contouring device was developed and built by the National Aviation Facilities Experimental Center (NAFEC) to aid in the preparation of procurement specifications. The device uses the new concept of contour symbol generation to produce lines, shaded areas, or other symbols necessary to generate contours of weather intensity. Unlike former techniques, this device generates homogeneous lines and is easily programmable for other formats. The device can provide dots or other symbols to the more intense side of a weather contour line clearly aiding the interpretation of the weather display. The device is designed to take advantage of digital signal transmission tecniques for the transmission of up to six levels of weather intensity. Any two of these six levels can be simultaneously displayed. The device was designed for those applications where plan position indicator (rho-theta) format is desired or necessary. Tests indicate that the device can generate contours which are exceptionally smooth and stable and are well suited to use in the air traffic control system. (Author)

AD-A082 990/3 PC **A08**/MF **A01**
Charles Stark Draper Lab Inc Cambridge MA
Millimeter Wave Applications of Large Aperture Systems.
Final technical rept. 30 Jun 78-31 Mar 79,
Francois Ayer. Feb 80, 164p R-1301, RADC-TR-79-277
Contract F30602-78-C-0128, ARPA Order-3537

This study proposes a structural design for the millimeter wave (MMW) antenna concept offered by Aerojet/NTL. It performs an assessment of the structural behavior of the satellite as it proceeds along its 500 km orbit. This effort concentrated on the definition and quantification of critical disturbances expected in the orbital environment. The design of a thermal blanket is arrived at through a number of thermal model analyses. The modeling of structural components and substructuring approaches are presented. The responses are evaluated for thermal loadings and dynamic disturbances. Based on the antenna deformational state, the performance is evaluated in term of point-spread functions (antenna loss of gain) and line-of-sight errors. A packaging and deployment technique is suggested for the surface panels, the back-up trusses and the feed tower to fit into the cargo bay of a single shuttle. Although the satellite is relatively heavy at 8800 kg, it is expected to perform satisfactorily in an almost completely passive manner. The evaluation of orbital dynamics shows the need for substantial propellant (2000 kg) to maintain the 500 km orbit. (Author)

PAT-APPL-6-123 338 PC **A02**/MF **A01**
Department of the Navy Washington DC
Clutter Filter Using a Minimum Number of Radar Pulses.
Patent Application,
James K. Hsiao. Filed 21 Feb 80, 17p AD-D007 144/9
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A clutter filter which reduces by (N-1) the number of input pulses required for operation of an N-pulse MTI canceler when L>N consecutive filtered outputs are desired. The clutter filter includes the two channels of an N- pulse MTI canceler which weight and sum the in-phaso and quadrature-phase components of N radar returns, and a pair of delay circuit which introduce a delay of N interpulse time periods to the N and subsequent in-phase and quadrature-phase components of the radar returns. The stored outputs of the two channels of the canceler and the consecutive outputs of the delay circuits are combined in a complex multiplier to generate the consecutive in-phase and quadrature-phase outputs of the filter. The clutter filter has utility in a multiple-stage filter system employing a Doppler filter as the last stage. (Author)

PATENT-4 196 435 Not available NTIS
Department of the Air Force Washington DC
Radar Pulse Phase Code System.
Patent,
Calvert F. Phillips, Jr. Filed 21 Aug 67, patented 1 Apr 80, 7p AD-D007 154/8, PAT-APPL-662 194

Supersedes PAT-APPL-662 194-67.
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

A radar system for reducing the effective width of a transmitted pulse without increasing power utilizing coded phase shifting. Discrete parts of the transmitted pulse are phase shifted 180 deg and upon return to the receiver the pulse is decoded by a sequence of delay lines and phase shifters positioned in accordance with a predetermined code rendering all the discrete parts in phase which are then summed. (Author)

PATENT-4 200 872 Not available NTIS
Department of the Air Force Washington DC
Doppler Compensated Digital Non-Linear Waveform Generator Apparatus.
Patent,
Thomas P. Sifferlen, and Fritz Steudel. Filed 13 Dec 78, patented 29 Apr 80, 7p AD-D007 163/9, PAT-APPL-968 895
Supersedes PAT-APPL-968 895-78, AD-D005 943.
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

/the present invention utilizes a digital waveform generator for Doppler compensation of waveforms to correct for dispersion due to target velocity. The apparatus utilizes a modified binary rate multiplier to produce an accurate clock signal that is related to target velocity. This variable or Doppler clock is used to drive a digital waveform generator to produce a signal for transmission that is predistorted in an opposite sense from the distortion or dispersion that is due to the target velocity. As a result, the return signal from the target has a zero Doppler appearance, which enhances signal processing. The present apparatus also includes a digital method of generating non-linear chirp waveforms. An advantage of using a non-linear chirp in radar is that pulse compression can be performed without incurring the 1 to 1.5 dB loss associated with weighting a linear FM pulse. However, non-linear chirp waveforms are limited to situations where target Doppler is small and/or the transmitted pulse length is short, or where compensation for target motion can be employed. The present method of Doppler compensation is applicable to all types of digital waveform generation, including linear and non-linear chirp waveforms.

17J. Seismic Detection

AD-A082 886/3 PC **A03**/MF **A01**
Teledyne Geotech Garland TX
special Data Collection System.
Final rept. Oct 77-Nov 79,
John R. Sherwin, and George C. Kraus. 30 Nov 79, 35p Rept no. TR-79-16
Contract F08606-78-C-0011, ARPA Order-2697
Continuation of Contract F08606-74-C-0013.

The Special Data Collection System (SDCS) program, is an extension of work begun under the Long-Range Seismic Measurements (LRSM) program in 1960. The work is directed primarily toward collection of high quality seismic data for the development of seismic techniques necessary to detect and identify underground nuclear explosions. In addition, the program also involves related special studies such as instrumentation development and special field studies using the equipment and capabilities of the program.

18. NUCLEAR SCIENCES AND TECHNOLOGY

18A. Fusion Devices (Thermonuclear)

ANL/FPP/TM-122 PC **A09**/MF **A01**
Argonne National Lab., IL.
Theory and Use of the Radioactivity Code RACC.
J. Jung. May 79, 179p
Contract W-31-109-ENG-38

This document serves as a user's manual for a FORTRAN-IV program RACC. RACC computes radioactivity and radioactivity-related parameters such as decay heat, decay gamma spectrum and biological hazard potential (BHP), primarily for fusion reactor systems. The computational algorithm in RACC is based on Gear's stiffly stable method. The RACC code features a versatile geometric capability including slab, sphere, cylinder, and torus in multidimensions. RACC is capable of interfacing with most of the standard multigroup, multidimensional neutron/photon transport codes currently available for fusion system application. In order to facilitate user's problem setup, all input arrays are read using the FIDO system. (ERA citation 05:012846)

ANL/FPP/TM-124 PC **A02**/MF **A01**
Argonne National Lab., IL.
Kinetic Solution of the Sheath Region in a Fusion Reactor.
J. N. Brooks. Dec 79, 22p
Contract W-31-109-ENG-38

The sheath region in a fusion reactor is studied with a one-dimensional kinetic code. The sheath potential, heat transmission, and sputtering of the boundary are all quite sensitive to electron reemission. The expected heat and particle fluxes in future fusion reactors leads to a prediction of keV-edge temperatures. (ERA citation 05:012812)

BNL-26878 PC **A02**/MF **A01**
Brookhaven National Lab., Upton, NY.
NOEL-A No-Leak Fusion Blanket Concept.
W. S. Yu, J. R. Powell, J. Fillo, F. Horn, and H. Makowitz. 1979, 8p CONF-791102-87
Contract EY-76-C-02-0016
Symposium on engineering problems of fusion research, San Francisco, CA, USA, 13 Nov 1979.

Thermal analysis and tests of a non-leak fusion blanket concept (NOEL-No External Leak) are presented. The NOEL blanket module operates with a material A that is present in both its solid and liquid phases. The solid phase zone of material A is maintained as a thick lining on the inside of blanket module shells (which are made of stainless steel, aluminum or any other structural metal and serve as the first wall) by cooling tubes embedded in the solid zone. These metal tubes carry a liquid or gas coolant B at a temperature below the melting point of A. Most of the 14 MeV neutron energy is deposited as heat in the module interior, and the temperature increase from the shell to the interior due to heat flow is sufficient to keep the interior liquid. Pressure on the liquid A interior is maintained at a higher level than the pressure on B, so that B can not leak out if failures occur in the coolant tubes embedded in the frozen layer. (ERA citation 05:012829)

CONF-7908101-1 PC **A02**/MF **A01**
Argonne National Lab., IL.
Role of Inert Gases in First Wall Phenomena in Fusion Devices.
S. K. Das. 1979, 15p
Contract W-31-109-ENG-38
Symposium on inert gases in metals, Harwell, UK, 8 Aug 1979.

The first wall surfaces of fusion devices will be exposed to bombardment by inert gaseous projectiles such as helium. The flux, energy and angular distribution of the helium radiation will depend not only on the type of device but also on its design parameters. For near term tokamak devices, the first wall surface phenomena caused by helium bombardment that appear to be quite important are physical sputtering and radiation blistering. Examples of these processes for a number of first wall candidate materials are discussed. While the physical sputtering phenomen is well understood, the mechanism of blister formation is still not fully understood. The various models proposed for radiation blistering of metal during helium bombardment is critically reviewed in the light of most recent experimental results. (ERA citation 05:012861)

CONF-791013-10 PC **A03**/MF **A01**
Oak Ridge National Lab., TN.
Review of the ISX-B Experimental Program.
M. J. Saltmarsh. 1979, 27p
Contract W-7405-ENG-26
26. national vacuum symposium, New York, NY, USA, 2 Oct 1979.

The ISX-B tokamak is a modestly sized device that is designed to explore questions closely related to the design of future tokamak devices, such as the Engineering Test Facility (ETF). The major program emphasis is on high- beta plasma operation using neutral beams to heat plasmas with noncircular cross sections. In addition, substantial efforts are under way or planned in the areas of plasma-wall interactions, coated limiter studies, electron-cyclotron heating, ripple injection, impurity flow reversal, pellet injection, and the application of a bundle divertor. The current status and future plans for these programs are reviewed. (ERA citation 05:012828)

CONF-791051-19 PC **A02**/MF **A01**
Argonne National Lab., IL.
Review of Session C: Fusion Dosimetry.
L. R. Greenwood. 1979, 10p
Contract W-31-109-ENG-38
ASTM-EURATOM symposium on reactor dosimetry, Ispra, Italy, 1 Oct 1979.

Fusion dosimetry includes materials irradiations in a variety of facilities. A general summary of the status of such dosimetry is presented with emphasis on outstanding problems, especially nuclear data needs. (ERA citation 05:012860)

COO-5069-28 PC **A02**/MF **A01**
Wisconsin Univ.-Madison. Engineering Experiment Station.
Current Density Profile Measurements in the Proto-Cleo Torsatron.
R. C. Schaeffer, and J. L. Shohet. Oct 79, 19p
Contract ET-78-S-02-5069

Current density profile measurements were obtained in the Proto-Cleo Torsatron (R = 40 cm, a = 5 cm, l = 3, B/sub T/ = 3 kG, anti n approx. 10 exp 11 cm exp -3 , T/sub e/ approx. 20 eV) by using a small, back-to-back flat double probe. Three different operating circuits used with this probe are presented, along with experimental results, all showing good agreement. Current is seen to flow only within the separatrix, in channels which follow the magnetic surfaces as they move radially inward with time due to changing vertical magnetic flux. (ERA citation 05:012832)

COO-5069-29 PC **A02**/MF **A01**
Wisconsin Univ.-Madison.
Engineering Design of Superconducting Magnets for a Torsatron Experiment.
S. W. Van Sciver, Y. M. Eyssa, M. A. Hilal, C. Miller, and J. L. Shohet. 1979, 3p CONF-791102-93
Contract ET-78-S-02-5069
Symposium on engineering problems of fusion research, San Francisco, CA, USA, 13 Nov 1979.

The design of superconducting magnets for a torsatron plasma confinement experiment are presented. A torsatron is a variation of a stellarator which requires half the helical windings and no toroidal field coil. Both the toroidal and poloidal fields are produced by a single set of helical winding. Due to the particular distribution of magnetic forces in the helical windings, the design of a torsatron configuration requires special consideration. In this paper, we present the force distribution on the helical coils. For the special case of uniformly distributed winding, magnetic forces and energy are calculated directly from formula for the inductance of toroids and dipoles. Significant reduction in the standard requirement can be achieved if the winding angle can be set at a particular value. (ERA citation 05:012833)

COO-5125-1 PC **A04**/MF **A01**
Wisconsin Univ.-Madison.
Studies of RF Tandem Mirror Heating. Annual Progress Report, October 1, 1978-September 30, 1979.
J. Kesner, G. A. Emmert, and J. E. Howard. May 79, 59p
Contract ET-79-S-02-5125

During the first 8 months of this project the questions of primary interest have been centered on the use of Ion Cyclotron Resonance Frequency

range (ICRF) wave heating in tandem mirror plugs. In particular we have been engaged in examining the following questions: (1) the use of ICRF to provide partial plug fueling in a tandem mirror, (2) the effect on spatial density and ambipolar potential distribution of the location of the wave-particle resonance zone, (3) dynamic stabilization of the Drift Cyclotron Loss-Cone instability due to the imposed ICRF. (ERA citation 05:012803)

DOE/ET-0065/7 PC **A09**/MF **A01**
Department of Energy, Washington, DC. Office of Fusion Energy.
Damage Analysis and Fundamental Studies. Quarterly Progress Report, July-October 1979.
Nov 79, 183p

Preliminary data are given for each of the following research areas: (1) rotating target neutron source, (2) nuclear data for FMIT, (3) experiments at ORR, (4) helium accumulation neutron dosimetry for the Be(d,n) irradiation environment, (5) FMIT damage parameter sensitivity study, (6) development of the STAYSL computer code, (7) damage production, and (8) damage microstructure evolution and mechanical behavior. (ERA citation 05:012862)

DOE/ET-53074 PC **A04**/MF **A01**
Massachusetts Inst. of Tech., Cambridge. Plasma Fusion Center.
Fusion Theory and Computations.
A. Bers, B. Coppi, R. Davidson, T. Dupree, and J. Freidberg. 1979, 61p
Contract AS02-78ET53074

It is proposed to carry out theoretical studies of the equilibrium, stability, transport and heating properties of high-temperature fusion plasmas. Continued emphasis will be placed on the effective interface of fusion theory and computations with the local Alcator, Versator, Constance and Torex experimental programs. The proposed research includes but will not be limited to the following types of studies: (a) investigation of RF heating of toroidal plasmas, (b) investigation of the MHD equilibrium and stability properties of tokamak plasmas, (c) develop the basic understanding of a wide variety of non-linear and turbulent phenomena, including stochastic magnetic fields, clumps and nonlinear saturation of linear instabilities, (d) investigate the effects of ambipolar fields on transport and stability properties of toroidal plasmas. Investigate high-beat stability properties of tandem-mirror systems, and (e) investigation of the MHD equilibrium and stability properties of Torsatron/Stellarator configurations. (ERA citation 05:012821)

DOE/NV/40023-T1 PC **A03**/MF **A01**
Hughes Research Labs., Malibu, CA.
Phase Conjugation for Laser Fusion. Final Report, 15 June 1979-14 October 1979.
D. G. Steel, and R. C. Lind. Nov 79, 47p
Contract ED-78-C-08-1563

Separate abstracts were prepared for each of the four included appendices. (ERA citation 05:012849)

GA-A-15597 PC **A02**/MF **A01**
General Atomic Co., San Diego, CA.
Design Considerations for Remote Maintenance of ETF.
P. H. Sager, Jr., and E. R. Hager. Sep 79, 22p CONF-791103-52
Contract AT03-76ET51011
American Nuclear Society meeting, San Francisco, CA, USA, 12 Nov 1979.

The Engineering Test Facility will provide the fusion reactor environment to test components and subsystems to be utilized on demonstration reactors. Target availability is 50%. Remote maintenance is required for components inside the reactor shield but contact work is planned outside the shield and during preparations for access to shielded equipment. Major remote equipment items and R and D needs are described. Cost of (reactor) exposure is proposed as a means to evaluate alternative concepts including maintenance philosophy. (ERA citation 05:009549)

GA-A-15619 PC **A02**/MF **A01**
General Atomic Co., San Diego, CA.
Magnetics Aspects of Martensitic Stainless Steels as Structural Materials for Tokamak Reactors.
W. Y. Chen, U. A. Peuron, P. H. Miller, Jr., J. M. Rawls, and S. N. Rosenwasser. Oct 79, 8p CONF-791102-56
Contract AT03-76ET51011
Symposium on engineering problems of fusion research, San Francisco, CA, USA, 13 Nov 1979.

Martensitic 9 to 12% chromium steels may offer significant advantages as a first wall/blanket material in terms of greater wall lifetime in comparison with commonly considered materials such as 20CW316. To evaluate the magnetics impact of a ferromagnetic blanket in a tokamak reactor, studies reported here have focused on two potential problem areas: the effects on plasma performance and the impact on the mechanical design of the blanket. A 3-D field code IRON allowing the presence of saturable ferromagnetic material was developed to facilitate the investigation. (ERA citation 05:009512)

GA-A-15626 PC **A02**/MF **A01**
General Atomic Co., San Diego, CA.
Thermal Stress Analysis and the Effect of Temperature Dependence of Material Properties on Doublet III Limiter Design.
T. E. McKelvey, A. E. Koniges, F. Marcus, M. Sabado, and R. Smith. Oct 79, 8p CONF-791102-48
Contract AT03-76ET51011
Symposium on engineering problems of fusion research, San Francisco, CA, USA, 13 Nov 1979.

Temperature and thermal stress parametric design curves are presented for two materials selected for Doublet III primary limiter applications. INC X-750 is a candidate for the medium Z limiter design and ATJ graphite for the low Z design. The dependence of significant material properties on temperature is shown and the impact of this behavior on the decision to actively or passively cool the limiter is discussed. (ERA citation 05:009513)

GA-A-15653 PC **A02**/MF **A01**
General Atomic Co., San Diego, CA.
Possible Incorporation of a Dee-Shaped Vacuum Vessel in Doublet III.
L. Davis, and J. M. Rawls. Nov 79, 7p CONF-791102-79
Contract AT03-76ET51011
Symposium on engineering problems of fusion research, San Francisco, CA, USA, 13 Nov 1979.

The design of Doublet III allows relative straightforward incorporation of any of a number of possible dee-configuration vacuum vessels that can serve as relevant size tests of reactor regime devices. Configurations simulating those of JET, ETF and INTOR with plasma areas larger than TFTR can be attained with significant physics parameter results. Such modifications to Doublet III could be incorporated into planned upgrade activites with operations beginning in 1984, early enough to influence the designs of ETF and INTOR and test the scaling laws, poloidal coil system, and impurity control systems proposed for these ignition devices. (ERA citation 05:012863)

GA-A-15654 PC **A02**/MF **A01**
General Atomic Co., San Diego, CA.
Doublet III Vacuum Vessel Neutral Beam Armor.
L. Sevier, L. Davis, E. Bailey, T. McKelvey, and R. Smith. Nov 79, 7p CONF-791102-77
Contract EY-76-C-03-0167-038
Symposium on engineering problems of fusion research, San Francisco, CA, USA, 13 Nov 1979.

The evolution of the Doublet III neutral beam armor is followed from the initial design of a radiation cooled metallic tile to the present actively cooled graphite design. Results of the thermal and stress analyses that dictated the present design are reviewed. (ERA citation 05:011006)

GA-A-15658 PC **A02**/MF **A01**
General Atomic Co., San Diego, CA.
1.5 Megawatt DC Chopper Power Supplies for Plasma Shape Control on Doublet III.
P. J. Rock, and J. C. Wesley. Nov 79, 8p CONF-791102-75
Contract AT03-76ET51011
Symposium on engineering problems of fusion research, San Francisco, CA, USA, 13 Nov 1979.

The Doublet III device is designed to study noncircular plasmas, including doublet and dee-shaped cross-sections. The plasma shape is determined by a system of 24 field-shaping coils which surround the vacuum vessel. Control of the magnetic flux linking these coils allows the plasma shape to be varied and controlled. This paper describes the high-speed dc chopper which is a major component of the field-shaping coil power system. The high-speed dc choppers, with a frequency response of up to 5 kHz and a switching power capability of 1.5 megawatts are used for fine tuning and feedback control of the plasma position and shape. The design and operation of two 1.5 megawatt, 3 kHz choppers used on closed loop plasma control experiments will be presented. (ERA citation 05:012841)

GA-A-15659 PC **A02**/MF **A01**
General Atomic Co., San Diego, CA.
Fiber-Optic High Voltage Isolation of CAMAC Highway.
S. T. Lee, and C. D. Moore. Nov 79, 7p CONF-791102-78
Contract EY-76-C-03-0167-038
Symposium on engineering problems of fusion research, San Francisco, CA, USA, 13 Nov 1979.

Fault analyses of the Doublet III Machine predict that a worst-case 30 kV might accidentally appear on control and data acquisition wiring connected to CAMAC interface systems. Such an accident could cause damage in CAMAC and computer equipment as distant as the control room, with attendant possibility of personal injury to operators and experimenters. Protection for control room personnel and equipment has been provided in the form of fiber-optic data link systems installed in CAMAC parallel branch and byte serial highways. Both fiber-optic data link systems were designed, documented, and fabricated at General Atomic, using vendor-supplied fiber-optic transmitter and receiver modules. (ERA citation 05:011007)

GA-A-15660 PC **A02**/MF **A01**
General Atomic Co., San Diego, CA.
Function and Operation of the Doublet III E-Coil Vacuum Breaker System.
R. W. Callis, G. Jackson, J. DeGrassie, P. Peterson, and F. LeVine. Nov 79, 7p CONF-791102-76
Contract AT03-76ET51011
Symposium on engineering problems of fusion research, San Francisco, CA, USA, 13 Nov 1979.

The ohmic heating system for the Doublet III fusion research device at General Atomic is required to provide the voltage for the initial breakdown phase (there is no preionization) along with the energy to drive the plasma current to a value of 2.5 MA or greater. This requires a peak one turn voltage of 250 volts (16 kV across coil terminals) and a magnetic flux swing of 5 volt-seconds (peak coil current of 110 kA). This voltage and flux swing is accomplished by reverse biasing the ohmic heating coil (E-coil) where, upon reaching a value of 110 ka the coil current is interrupted and commutated into a RC network producing 16 kV across the coil. The interruption of the E-coil current is accomplished by the use of an array of vacuum circuit breakers (VCB's) and a counter plus network. A description is given of the ohmic heating circuit and the performance of the vacuum circuit breaker array and its counter pulse system. (ERA citation 05:012842)

IAE-3003 PC **A02**/MF **A01**
Gosudarstvennyi Komitet po Ispol'zovaniyu Atomnoi Energii SSSR, Moscow. Inst. Atomnoi Energii.
Near-Insulator Processes in the Plasma Accelerators with Dielectric Erosion.
Yu. A. Alekseev, and M. N. Kazeev. 1978, 20p
In Russian.
U.S. Sales Only.

The results of experimental investigation in the near-insulator zone in plasma accelerators with dielectric erosion are submitted. The concentration behaviour of electrons as well as neutral particles in the near-insulator zone is described. The results are compared with the simple ionization model in the gas current. The quantitative dependency of

matter consumption in the accelerator from the charge parameters is proposed. (Atomindex citation 10:477971)

LA-UR-79-3277 PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
Tritium Control at the Tritium Systems Test Assembly.
R. A. Jalbert. 1980, 5p CONF-800304-1
Contract W-7405-ENG-36
International congress of the International Radiation Protection Association, Jerusalem, Israel, 8 Mar 1980.

The Tritium Systems Test Assembly (TSTA) is a computer-controlled facility designed to mock up full-scale the deuterium-tritium fuel cycle of next-generation tokamak fusion test reactors. Such reactors will use or build on the experience and technologies of the TSTA and other engineering facilities. The TSTA is presently under construction at the Los Alamos Scientific Laboratory and will be fully operational in 1982. (ERA citation 05:012847)

LBL-10081 PC **A02**/MF **A01**
California Univ., Berkeley. Lawrence Berkeley Lab.
Large Area Negative Ion Source for High Voltage Neutral Beams.
P. Poulsen, and E. B. Hooper, Jr. Nov 79, 7p
CONF-791102-89
Contract W-7405-ENG-48
Symposium on engineering problems of fusion research, San Francisco, CA, USA, 13 Nov 1979.

A source of negative deuterium ions in the multiampere range is described that is readily extrapolated to reactor size, 10 amp or more of neutral beam, that is of interest in future experiments and reactors. The negative ion source is based upon the double charge exchange process. A beam of positive ions is created and accelerated to an energy at which the attachment process D + M implies D exp - + M exp + proceeds efficiently. The positive ions are atomically neutralized either in D sub 2 or in the charge exchange medium M. Atomic species make a second charge exchange collision in the charge target to form D exp - . For a sufficiently thick target, the beam reaches an equilibrium fraction of negative ions. For reasons of efficiency, the target is typically alkali metal vapor; this experiment uses sodium. The beam of negative ions can be accelerated to high (>200 keV) energy, the electrons stripped from the ions, and a high energy neutral beam formed. (ERA citation 05:014561)

LBL-10155 PC **A02**/MF **A01**
California Univ., Berkeley. Lawrence Berkeley Lab.
Combining Magnetic Shielding and Cryopumping for a Neutral Beam Source.
J. Tanabe, and M. A. Green. Oct 79, 6p CONF-791102-98
Contract W-7405-ENG-48
Symposium on engineering problems of fusion research, San Francisco, CA, USA, 13 Nov 1979.

This paper describes a feasible geometry for the shield/cryopump for a TFTR/Doublet type of neutral beam source, summarizes some of the design parameters, and compares the performance, fabrication, and operating cost of such a system with a more conventional system. (ERA citation 05:014562)

LBL-10291 PC **A03**/MF **A01**
California Univ., Berkeley. Lawrence Berkeley Lab.
Heavy Ion Fusion Program. Year-End Report, October 1978-September 1979.
1979, 31p
Contract W-7405-ENG-48

The more significant activities and results reported for this year are: (1) Commissioning, in January 1979, of a large-area Cs exp +1 ion source of 1.2 amperes at 500 kV. (2) Commissioning, in July 1979, of the first drift-tube of the three drift-tube accelerator. (3) Acceleration, in January 1979, of a high-brightness, 40 milliampere Xe exp +1 beam through a Cockcroft-Walton column to 500 kV and confirmation of satisfactory emittance and charge distribution. (4) Development of a conceptual design for a 500 J induction linac test-bed facility to test many of the features needed for the success of an igniter (LBL PUB 5031). (5) Improvements to the systems studies of a Heavy Ion Induction Linac Driver over a wide parameter range with emphasis on cost and efficiency trade-off. (6) Start-up of a (Cs exp +1 , Cs exp +1) ion-ion cross section measurement program. Initial results of the scattering of Cs exp +1 ions on Xe gas (electronically similar to Cs exp +1) have shown some surprising results. (7) Expansion of theoretical studies on the behavior of space-charge dominated ion beams. (ERA citation 05:012854)

LBL-9406 PC **A02**/MF **A01**
California Univ., Berkeley. Lawrence Berkeley Lab.
Protection and Fault Detection for Lawrence Berkeley Laboratory Neutral Beam Sources.
D. B. Hopkins, W. R. Baker, K. H. Berkner, K. W. Ehlers, and V. J. Honey. Nov 79, 8p CONF-791102-90
Contract W-7405-ENG-48
Symposium on engineering problems of fusion research, San Francisco, CA, USA, 13 Nov 1979.

Testing of TFTR neutral beam (NB) sources has begun at the LBL Neutral Beam System Test Facility (NBSTF). Operation at 120 kV, 65 A, 0.5 sec should be achieved soon. Because NB sources spark down frequently during conditioning, the main accelerating (accel) power supply must be interrupted within a few microseconds to avoid degrading the voltage holding capability, or even the damaging, of the NB source. A variety of improper magnitudes and/or ratios of voltages, currents, and times can occur and must be recognized as fault conditions in order to initiate a prompt interruption of the accel power supply. This paper discusses in detail the key signals which must be monitored and the manner in which they are processed in fault detector circuitry for safe operation of LBL NB sources. The paper also reviews the more standard interlocks and protective features recommended for these sources. (ERA citation 05:012843)

NRL-MR-4132 PC **A03**/MF **A01**
Naval Research Lab., Washington, DC.
Stability of Self-Similar Flow. 6. Uniform Implosion of an Ablatively Driven Shell.
D. L. Book, and I. B. Bernstein. 17 Dec 79, 34p
Contract ES-77-A-01-6021

The linear stability of a uniformly imploding shell, modeled as an ideal polytropic fluid, is investigated. Two types of unstable modes are found: incompressible irrotational perturbations localized at the outer surface, ascribable to Rayleigh-Taylor instability, and compressible modes, associated with convective instability. KIDDER's (1976) result for the Rayleigh-Taylor modes is shown to hold independently of the form of the shell density profile. By means of a variational principle it is shown that the criterion for convective instability is the existence of a region within which d(prho exp - /sup gamma /)/dr > 0. Analytic solutions for both spatial and temporal dependence of the perturbations are presented, and the results applied to pellets imploded by the action of a laser or charged-particle beam. (ERA citation 05:011000)

N80-21158/4 PC **A02**/MF **A01**
Nagoya Univ. (Japan). Inst. of Plasma Physics.
High Power Ion-Irradiation Test for CTR First Wall.
A. Mohri, K. Narihara, Y. Tomita, T. Tsuzuki, and Z. Kabeya. Jan 80, 12p IPPJ-437

High power irradiation of ions on metal surface can be obtained by using plasma anode for electron beam generation. The irradiation power of 600 keV protons was 50 MW/sq cm which is comparable with pulse power loading of CTR Tokamak first wall at a strong major disruption. Damage of 304 stainless steel by this irradiation was different from by usual irradiation of ions at low power level.

ORNL/SUB-21453/1 PC **A03**/MF **A01**
Varian Associates, Inc., Palo Alto, CA.
EBT-P 110 GHZ Development Program. Quarterly Report No. 1, September 1979.
J. Shively, C. Conner, F. Friedlander, E. Galli, and H. Jory. 1979, 41p
Contract W-7405-ENG-26

The objective of this program is to develop a microwave amplifier or oscillator capable of producing 200 kW CW power output at 110 GHz. The use of cyclotron resonance interaction is being pursued. The early design phases of this three and one half year program are discussed. (ERA citation 05:012844)

ORNL/TM-7107 PC **A03**/MF **A01**
Oak Ridge National Lab., TN.
General Principles of Magnetic Fusion Confinement.
J. T. Hogan. Jan 80, 40p
Contract W-7405-ENG-26

A few of the areas are described in which there is close interaction between atomic/molecular (A and M) and magnetic fusion physics. The comparisons between predictions of neoclassical transport theory and experiment depend on knowledge of ionization and recombination rate coefficients. Modeling of divertor/scrapeoff plasmas requires better low energy charge exchange cross sections for H + A/sup n+ / collisions. The range of validity of neutral beam trapping cross sections must be broadened, both to encompass the energies typical of present injection experiments and to deal with the problem of prompt trapping of highly excited beam atoms at high energy. Plasma fueling models present certain anomalies that could be resolved by calculation and measurement of low energy (<1 keV) charge exchange cross sections. (ERA citation 05:012817)

ORNL/TM-7124 PC **A03**/MF **A01**
Oak Ridge National Lab., TN.
Deuterium and Tritium Fuelding in an ETF/INTOR Plasma with Divertor.
W. A. Houlberg, H. C. Howe, and S. E. Attenberger. Jan 80, 34p
Contract W-7405-ENG-26

Fueling by pellets and neutral gas in the presence of a divertor is examined with a one-dimensional multispecies transport code. Deuterium, tritium, and alpha particles are treated as independent thermal species. With an efficiently operating divertor, it becomes impossible to maintain high plasma density (anti n approx. 10 exp 14 cm exp -3) with neutral gas fueling alone because of the high probability of the gas being ionized in the scrapeoff layer. Pellet fueling significantly reduces the particle load on the divertor and, with feedback control, can maintain the plasma density at the desired level. A low level of deuterium gas fueling can then be used to maintain the density of the scrapeoff layer and increase shielding against sputtered impurities. Even with an effective shielding divertor, the energy and particle fluxes to the first wall from both charged and neutral particles may be significant. The fluctuations at the plasma edge and in the scrapeoff layer introduced by the pellets cause the particle and energy fluxes to the divertor and first wall to fluctuate. This makes simulation more difficult but may be used to experimentally determine radial and parallel transport properties in the scrapeoff layer. Recommendations for further study are made. (ERA citation 05:012845)

PAT-APPL-6-134 717 PC **A03**/MF **A01**
Department of the Navy Washington DC
Tokamak Plasma Heating with Intense, Pulsed Ion Beams.
Patent Application,
Wallace M. Manheimer, and Niels K. Winsor.
Filed 27 Mar 80, 28p AD-D007 152/2
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

An intense, space-charge-neutralized, pulsed ion beam is used to heat a magnetically-confined plasma, such as tokamak plasma, by injecting the ion beam into the plasma along a trajectory that is generally tangential to the confining magnetic field. The intense ion beam is injected into the tokamak before the plasma is fully formed, the remainder of the plasma is formed around the beam, and the beam transfers its energy to the plasma by classical collisions with the electrons and ions of the plasma. Heating of the plasma can be sufficient to produce breakeven or ignition. (Author)

PB80-170046 PC **A04**/MF **A01**
Netherlands Energy Research Foundation ECN, Petten.

A Reactor Study on a Belt-Shaped Screw Pinch,
M. Bustraan, B. Brandt, G. C. Damstra, W. M. P. Franken, and J. A. Hoekzema. Oct 79, 51p ECN-77
Also pub. as Rijnhuizen Report 79-118.

A previous study on a screw-pinch reactor with circular cross-section (ECN-16 (1977) or Rijnhuizen report 77-101) has been extended to a belt configuration which allows to raise beta to 0.5. The present study starts from the main assumptions and principal constraints of the previous work, but some technical aspects are treated more realistically. More attention has been paid to the modular construction, the nonuniform distribution of the wall loading, the thermo-hydraulics, the design of and the losses in the coil systems, and the energy storage and electric transmission systems. A potential use of the first wall of the blanket as part of the implosion coil system is suggested. Finally, a conceptual design of a reactor, with a cost estimate, is given. Numerical results are given of parameter variations around the values for the reference reactor.

PB80-170384 PC **A02**/MF **A01**
Netherlands Energy Research Foundation ECN, Petten.
Estimated Target Accuracies for Neutronic Responses in Fusion Reactors,
K. A. Verschuur. Dec 79, 19p ECN-64

Neutronics responses play an important role in plant design, in that way that they determine dimensions of components, the lifetime of components, the thermal power produced, and ultimately the electricity cost. Most system studies contain sufficient information to derive cost sensitivities for the main neutronic responses, which then can be used for the estimation of target accuracies. Target accuracies for the energy-multiplication of the blanket, the tritium breeding ratio, the radiation damage and radiation heating of the superconducting coils and the dose rate behind the biological shield, have been calculated for three UWMAK studies, the PPPL, and the reversed field pinch of Culham and Los Alamos.

PPPL-EPRI-8 PC **A02**/MF **A01**
Princeton Univ., NJ. Plasma Physics Lab.
Engineering Test Station for TFTR Blanket Module Experiments.
D. L. Jassby, and S. Leinoff. Dec 79, 9p CONF-791102-91
Contract EY-76-C-02-3073
Symposium on engineering problems of fusion research, San Francisco, CA, USA, 13 Nov 1979.

A conceptual design has been carried out for an Engineering Test Station (ETS) which will provide structural support and utilities/instrumentation services for blanket modules positioned adjacent to the vacuum vessel of the TFTR (Tokamak Fusion Test Reactor). The ETS is supported independently from the Test Cell floor. The ETS module support platform is constructed of fiberglass to eliminate electromagnetic interaction with the pulsed tokamak fields. The ETS can hold blanket modules with dimensions up to 78 cm in width, 85 cm in height, and 105 cm in depth, and with a weight up to 4000 kg. Interfaces for all utility and instrumentation requirements are made via a shield plug in the TFTR igloo shielding. The modules are readily installed or removed by means of TFTR remote handling equipment. (ERA citation 05:012831)

PPPL-1572 PC **A03**/MF **A01**
Princeton Univ., NJ. Plasma Physics Lab.
Current Penetration in the PLT Tokamak.
R. J. Hawryluk, N. Bretz, D. Dimock, E. Hinnov, and D. Johnson. Jan 80, 35p
Contract EY-76-C-02-3073

Current penetration in the PLT tokamak is modeled by a one dimensional magnetic field diffusion code assuming neoclassical resistivity. The code uses the measured temperature and density profiles as well as current and voltage measurements to evaluate Z/sub eff/. Under certain conditions, the resulting calculations of Z/sub eff/ during the startup phase have been considerably larger than the Z/sub eff/ determined spectroscopically indicating the presence of an enhanced current penetration mechanism. Furthermore, these calculations indicate that the gross energy confinement time is substantially less during the startup phase than in the quasi-steady state. (ERA citation 05:012818)

PPPL-1586 PC **A02**/MF **A01**
Princeton Univ., NJ. Plasma Physics Lab.
Transient Getter Scheme for the Tokamak Fusion Test Reactor.
J. L. Cecchi, S. A. Cohen, and J. J. Sredniawski. Jan 80, 19p
Contract EY-76-C-02-3073

The ability of the Tokamak Fusion Test Reactor (TFTR) to attain the largest fusion power gain depends critically on minimizing plasma contamination and controlling the densities of the reacting deuterium and tritium. Experiments on a number of tokamaks have demonstrated that gettering over an appreciable surface area (greater than or equal to 10%) of the vacuum vessel greatly facilitates both of these objectives. One particular problem in implementing a surface pumping system in TFTR, however, is a restriction on the maximum allowable tritium content of the getter. This restriction could require regeneration of the absorbed tritium after as few as 50 machine pulses. We have developed a scheme utilizing SAES Zr/Al getter modules which obviates the need for such frequent interruptions of machine operation by taking advantage of the pulsed operation of TFTR. With the Zr/Al getter at temperatures between 500 exp 0 C to 600 exp 0 C it is possible to achieve a quasi-steady state in the tritium loading where the quantity of tritium desorbed between pulses is equal to the quantity which is absorbed during a pulse. Since frequent thermal cycling is not required, this scheme also reduces the possibility of Zr/Al getter material fatigue. (ERA citation 05:012811)

PPPL-1618 PC **A02**/MF **A01**
Princeton Univ., NJ. Plasma Physics Lab.
Energy Confinement Comparison of Ohmically Heated Stellarators to Tokamaks.
T. K. Chu, and Y. C. Lee. Dec 79, 19p
Contract EY-76-C-02-3073

An empirical scaling prescribes that the energy confinement time in ohmically heated stellarators and tokamaks is proportional to the internal energy of the plasma and the minor radius, and inversely proportional to the current density. A thermal-conduction energy transport model, based on a heuristic assumption that the effective momentum transfer in the radial direction is proportional to the classical parallel momentum transfer which results in ohmic heating, is used to explain this scaling. (ERA citation 05:012804)

PPPL-1620 PC **A02**/MF **A01**
Princeton Univ., NJ. Plasma Physics Lab.
Steady-State Resistive Toroidal-Field Coils for Tokamak Reactors.
J. Kalnavarns, and D. L. Jassby. Dec 79, 10p CONF-791102-88
Contract EY-76-C-02-3073
Symposium on engineering problems of fusion research, San Francisco, CA, USA, 13 Nov 1979.

If spatially-averaged values of the beta ratio can reach 5 to 10% in tokamaks, as now seems likely, resistive toroidal-field coils may be advantageous for use in reactors intended for fusion-neutron applications. The present investigation has parameterized the design of steady-state water-cooled copper coils of rectangular cross section in order to maximize figures of merit such as the ratio of fusion neutron wall loading to coil power dissipation. Four design variations distinguished by different ohmic-heating coil configurations have been examined. For a wall loading of 0.5 MW/m sub 2 , minimum TF-coil lifetime costs (including capital and electricity costs) are found to occur with coil masses in the range 2400 to 4400 tons, giving 200 to 250 MW of resistive dissipation, which is comparable with the total power drain of the other reactor subsystems. (ERA citation 05:012834)

PPPL-1622 PC **A02**/MF **A01**
Princeton Univ., NJ. Plasma Physics Lab.
Ballooning-Mode Theory of Trapped-Electron Instabilities in Tokamaks.
C. Z. Cheng, and L. Chen. Dec 79, 19p
Contract EY-76-C-02-3073

Employing the ballooning-mode formalism, the two-dimensional eigenmode equation for trapped-electron instabilities in tokamaks is reduced to a one-dimensional integro-differential equation along the magnetic field lines; which is then analyzed both analytically and numerically. Dominant toroidal coupling effects are due to ion magnetic drifts which create quasi-bounded states. The trapped-electron response can be treated as perturbation and is found to destablize the quasi-bounded states. (ERA citation 05:012825)

PPPL-1624 PC **A04**/MF **A01**
Princeton Univ., NJ. Plasma Physics Lab.
Current Generation with Low-Frequency Waves.
N. J. Fisch, and C. F. F. Karney. Dec 79, 58p
Contract EY-76-C-02-3073

Various types of traveling waves may be injected into a tokamak to continuously sustain the toroidal current. Interest in this problem arises from the possibility of operating tokamak reactors in the steady state. The low-frequency waves most suitable for this task are identified in terms of the power cost for deployment in a reactor. Means of exciting these waves and tradeoffs with design criteria are discussed. A comparison is made with the alternative attractive regime of high-frequency waves. Conclusions are based, in part, on the numerical solution of the two-dimensional Fokker-Planck equation with an added quasilinear term due to the waves. (ERA citation 05:010955)

SAN-0034/202-1 PC **A03**/MF **A01**
California Univ., Los Angeles.
Production of Iterated Leakage from a Mirror Machine Using Iron Bars. Final Report, June 15, 1972-July 31, 1975.
A. T. Forrester, and J. T. Crow. 19 Jun 79, 36p
Contract EY-76-S-03-0034-202

It is a goal of this program to split the ion flux out of a mirror machine into a sufficiently large number of beams that the space charge in each is small and easily controlled. A means of doing this is illustrated schematically. A perforated iron slab is placed in the throat of the mirror machine in the hope that the field at the holes in the ion will be sufficiently weakened that particles will escape through these holes before they can drift into the escape cones corresponding to other portions of the mirror throat. (ERA citation 05:012805)

SAND-79-1011 PC **A08**/MF **A01**
Sandia Labs., Albuquerque, NM.
Particle Beam Fusion. Progress Report, April 1978-December 1978.
Dec 79, 156p
Contract EY-76-C-04-0789

During this period substantial improvements in the theoretical basis for particle beam fusion as well as the execution of critical experiments were instrumental in further definition of the optimum route to our goals of demonstrating scientific and practical feasibility. The major emphasis in the program continues to be focused primarily on issues of power concentration and energy deposition of intense particle beams in solid targets. This utilization of program resources is directed toward conducting significant target implosion and thermonuclear burn experiments using EBFA-I (1 MJ) in the 1981-1983 time period. This step, using EBFA-I, will then set the stage for net energy gain experiments to follow on EBFA-II (> 2 MJ) after 1985. Current program emphasis and activities differ substantially from those stressed in the laser approaches to inertial confinement fusion. Here the critical issues relate to delivering the needed power densities and energies to appropriate targets and to insure that the coupling of energy is efficient and matches target requirements. (ERA citation 05:012855)

SAND-79-1629 PC **A06**/MF **A01**
Sandia Labs., Albuquerque, NM.
Automatic Calibration and Signal Switching System for the Particle Beam Fusion Research Data Acquisition Facility.
W. B. Boyer. Sep 79, 103p
Contract EY-76-C-04-0789

This report describes both the hardware and software components of an automatic calibration and signal system (Autocal) for the data acquisition system for the Sandia particle beam fusion research accelerators Hydra, Proto I, and Proto II. The Autocal hardware consists of off-the-shelf commercial equipment. The various hardware components, special modifications and overall system configuration are described. Special software has been developed to support the Autocal hardware. Software operation and maintenance are described. (ERA citation 05:012856)

SAND-79-1927C PC **A02**/MF **A01**
Sandia Labs., Albuquerque, NM.
Ion Beam Energy Deposition Physics for ICF Targets.
T. A. Mehlhorn. 1980, 4p CONF-800208-4
Contract EY-76-C-04-0789
Tropical meeting on inertial confinement fusion, San Diego, CA, USA, 26 Feb 1980.

The target interaction physics of light ion beams will be described. The phenomenon of range shortening with increasing material temperature will be corroborated, and the concomittant phenomenon of range relengthening due to ion-electron decoupling will be introduced. (ERA citation 05:012857)

SAND-79-1941C PC **A02**/MF **A01**
Sandia Labs., Albuquerque, NM.
Calibration Model for the DCXC X-Ray Camera.
D. L. Fehl, and J. Chang. 1980, 4p CONF-800208-6
Contract EY-76-C-04-0789
Tropical meeting on inertial confinement fusion, San Diego, CA, USA, 26 Feb 1980.

A physical model for the DCXC camera used in x-radiographic studies of inertial confinement fusion (ICF) targets is described. Empirical calibration procedures, based on pulsed, bremsstrahlung sources, are proposed. (ERA citation 05:011390)

SAND-79-1942C PC **A02**/MF **A01**
Sandia Labs., Albuquerque, NM.
Target Fabrication for Particle Beam Fusion.
K. W. Bieg, and J. Chang. 1980, 4p CONF-800208-5
Contract EY-76-C-04-0789
Tropical meeting on inertial confinement fusion, San Diego, CA, USA, 26 Feb 1980.

Near-term exploding pusher targets for electron or light ion beam driven fusion are typically several mm in diameter and have relatively thick shells (rho r approx. 0.001 to 0.03 gm/cm exp 2). Current fabrication techniques utilize parylene polymer coatings on leachable mandrels. (ERA citation 05:011391)

SAND-79-1943C PC **A02**/MF **A01**
Sandia Labs., Albuquerque, NM.
Two-Frame Flash X-Radiography System for Target Implosion Studies.
J. Chang, and D. L. Fehl. 1980, 4p CONF-800208-2
Contract EY-76-C-04-0789
Tropical meeting on inertial confinement fusion, San Diego, CA, USA, 26 Feb 1980.

A two-frame flash x-radiography system has been developed to study target implosion dynamics. It is capable of taking two time separated 3 ns exposure x-ray shadowgrams of a particle beam driven target implosion. (ERA citation 05:012858)

SAND-79-1949C PC **A02**/MF **A01**
Illinois Univ. at Urbana-Champaign.
Analytic Theory of the Spherical Electron to Ion Convertor.
J. T. Verdeyen, and P. A. Miller. 1980, 4p CONF-800208-7
Contract EY-76-C-04-0789
Tropical meeting on inertial confinement fusion, San Diego, CA, USA, 26 Feb 1980.

Calculations will be presented which indicate that one could, with high efficiency, convert the electron beam energy transported from many pinched diode to ions at a reasonably sized evacuated spherical shell - or a light bulb. (ERA citation 05:012859)

SAND-80-0177C PC **A02**/MF **A01**
Sandia Labs., Albuquerque, NM.
Research and Application of Pulsed-Power Technology.
G. Yonas. 12 Jan 80, 19p
Contract EY-76-C-04-0789

Pulsed-power technology relating to that branch which was stimulated by military applications in the 1960's is addressed. A history of the development and characteristics of some devices producing intense electron and ion beams which resulted in Sandia's particle beam fusion program is presented. These include Hermes II, Aurora, Hydra, and Proto II. Research on inertial confinement fusion ignition is described, and the most critical issue in ICF today still is the demonstration of ignition and efficient burnup of a small amount of thermonuclear fuel. Progress on the Sandia particle beam fusion accelerator (PBFA I and II) is reported, but already plans are underway to further upgrade the device and if these modifications are carried out in 1983, fusion ignition concepts may be tested by 1985. Fusion could possibly provide an inexhaustible supply of energy in the next century. (ERA citation 05:014570)

TRITA-EPP-79-01 PC **A03**/MF **A01**
Royal Inst. of Tech., Stockholm (Sweden). Institutionen foer Plasmafysik.
Electromagnetic Shielding Formulae.
E. Dahlberg. Feb 79, 40p
U.S. Sales Only.

This addendum to an earlier collection of electromagnetic shielding formulae (TRITA-EPP-75-27) contains simple transfer matrices suitable for calculating the quasistatic shielding efficiency for multiple transverse-field and axial-field cylindrical and spherical shields, as well as for estimating leakage fields from long coaxial cables and the normal-incidence transmission of a plane wave through a multiple plane shield. The differences and similarities between these cases are illustrated by means of equivalent circuits and transmission line analogies. The addendum also includes a discussion of a possible heuristic improvement of some shielding formulae. (Atomindex citation 10:478023)

TRITA-PFU-79-03 PC **A03**/MF **A01**
Royal Inst. of Tech., Stockholm (Sweden). Institutionen foer Plasmafysik med Fusionsforskning.
Measurements of Electron Density and Temperature Profiles in a Gas Blanket Experiment.
A. Kuthy. Feb 79, 26p
U.S. Sales Only.

Radial profiles of electron density, temperature and H sub(beta) intensity are presented for the rotating plasma device F-1. The hydrogen filling pressure, the average magnetic field strength at the midplane, and the power input to the discharge have been varied in the ranges 10-100 mTorr, 0.25-0.5 Tesla, and 0.1 to 1.5 MW, respectively. These experiments have been performed with the main purpose of studying the gas blanket (cold-mantle) state of the plasma. It is shown, that a simple spectroscopic method can be used to derive the radial distribution of the electron temperature in such plasmas. The observed peak temperatures and densities are in agreement with earlier theoretical estimates. (Atomindex citation 10:478101)

TRITA-PFU-79-05 PC **A02**/MF **A01**
Royal Inst. of Tech., Stockholm (Sweden). Institutionen foer Plasmafysik med Fusionsforskning.
Scaling of Magnetic Plasma Confinement under Classical Conditions.
B. Lehnert. Apr 79, 14p
U.S. Sales Only.

Present magnetic confinement schemes based on tokamaks and similar devices are characterized by relatively large losses and low beta values. As a consequence, thermonuclear conditions can only be reached in such devices at large linear dimensions or by means of very strong magnetic fields, in combination with large heating powers. This does not rule out the possibility of realizing the same conditions on a smaller scale, i.e. by finding alternative schemes which provide classical and stable confinement of a pure plasma in a closed magnetic bottle. (Atomindex citation 10:478109)

UCID-18500 PC **A02**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Nozzle Model of Flowing Plasma with Field Reversal.
J. W. Shearer. 7 Jan 80, 23p
Contract W-7405-ENG-48

The flowing plasma outflow from a field-reversed plasma gun is modeled by a one-dimensional calculation which is based on the well-known problem of fluid flow through a nozzle. The results suggest that a low plasma mass flow rate is necessary for reconnection to be important. Comparison with 2D MHD calculations and with preliminary data from the BETA-II experiment are consistent with the model at this time. (ERA citation 05:010998)

UCID-18505 PC **A03**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Tandem Mirror Thermal Barrier Experimental Program Plan.
F. H. Coensgen, R. P. Drake, and T. C. Simonen. 2 Jan 80, 29p
Contract W-7405-ENG-48

This report describes an experimental plan for the development of the Tandem Mirror Thermal Barrier. Included is: (1) a description of thermal barrier related physics experiments; (2) thermal barrier related experiments in the existing TMX and Phaedrus experiments; (3) a thermal barrier TMX upgrade; and (4) initiation of investigations of axisymmetric magnetic geometry. Experimental studies of the first two items are presently underway. Results are expected from the TMX upgrade by the close of 1981 and from axisymmetric tandem mirror experiments at the end of 1983. Plans for Phaedrus upgrades are developing for the same period. (ERA citation 05:012806)

UCRL-15105 PC **A03**/MF **A01**
Energy Technology Engineering Center, Canoga Park, CA.
Liquid Metal Engineering Aspects of a Commercial-Sized Power Plant Based on the HYLIFE Converter Concept.
N. J. Hoffman, and M. W. McDowell. Dec 79, 45p
Contract W-7405-ENG-48

A study of a commercial fusion plant based on the High Yield Lithium Injection Fusion Energy (HYLIFE) converter has been performed. A net efficiency of 33.3% was derived for a plant using 2-1/4 Cr - 1 Mo ferritic steel as structural alloy. Use of a thick lithium fall to protect structural materials from the deleterious effects of pellet thermonuclear burn allows the structure to last the life of the plant without replacement. Both mechanical pumps and EM pumps are analyzed for this application. The power requirement for the lithium fall mechanical pumps is approx. 20 MWe. This is a relatively insignificant 1.6% of the gross electrical power output of the plant of approx. 1250 MWe. An EM pump has a greater electrical requirement but the lesser head (NPSH) requirement of an EM pump appears to be a marked advantage since this affects the size of the lithium inventory. The preferred tritium separation method appears to be that developed by Argonne National Laboratory which involves mixing lithium into an immiscible liquid having a greater affinity for hydrogen isotopes, with subsequent electrolytic separation. The immiscible liquid under consideration is a lithium bromide-lithium fluoride-lithium chloride mixture. (ERA citation 05:011001)

UCRL-15148 PC **A03**/MF **A01**
General Dynamics, San Diego, CA. Convair Div.
Structural Analysis Interpretation Task for the Magnet System for Mirror Fusion Test Facility (MFTF).
R. W. Baldi. Nov 79, 42p
Contract W-7405-ENG-48

The primary objective of this study was to develop recommendations to improve and substantiate the structural integrity of the highly stresses small radius region of the MFTF magnet. The specific approach is outlined: (1) Extract detail stress/strain data from General Dynamics Convair Finite-Element Refinement Analysis. (2) Diagram local plate stress distribution and its relationship to the adjacent weldment. (3) Update the parametric fracture mechanics analysis using most recent MFTF related data developed by National Bureau of Standards. (4) Review sequence and assembly

as modified by Chicago Bridge and Iron for adaptability to refinements. (5) Investigate the need for fillet radii weldments to reduce stress concentrations at critical corners. (6) Review quality assurance plan for adequacy to insure structural quality in the small radius region. (7) Review instrumentation plan for adequacy of structural diagnostics in small radius region. (8) Participate in planning a small-scale fatigue test program of a typical MFTF weldment. (ERA citation 05:012835)

UCRL-15156 PC **A02**/MF **A01**
Airco, Inc., Murray Hill, NJ. Central Research Labs.
Final Report Covering Work Done under LLL P.O. No. 4165009.
C. Spencer. 21 Sep 79, 22p SU-79-107
Contract W-7405-ENG-48

The High Field Test Facility (HFTF) to be built at Lawrence Livermore Laboratories (LLL) consists of a magnet which will be wound with Nb sub 3 Sn superconductor. Embossed and electroplated copper strip will be soldered to the two broad sides of a rectangular Nb sub 3 Sn superconductor 5.4 mm x 11.0 mm x approximately 100 m long. It is the purpose of this project to upgrade existing facilities to emboss the copper stabilizer strip, electroplate the strip with 50 Pb-50 Sn solder, and to solder two such strips to the superconductor. This program has been approached in seven separate tasks which are described in this report. (ERA citation 05:012836)

UCRL-80269(Rev.1) PC **A02**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Technique for Full Surface Examination of Small Spheres in the Scanning Electron Microscope.
C. M. Ward, C. D. Hendricks, and B. W. Weinstein. 17 Apr 78, 17p CONF-780415-6(Rev.1)
Contract W-7405-ENG-48
Scanning electron microscopy conference, Los Angeles, CA, USA, 16 Apr 1978.

In response to the increasing severity of target surface finish requirements for laser fusion experiments, it has become necessary to examine spherical targets in the Scanning Electron Microscope, prior to laser irradiation, on an orderly nondestructive basis. We have developed a new sample manipulation technique which rolls a thin wall sphere through 4 pi steradians, minimizes damage and allows easy recovery. The sphere is placed between two parallel plane surfaces formed in conductively coated silicone rubber on the ends of capillaries. Mechanical slides cause the capillaries to translate laterally and roll the ball bringing the entire surface of the sphere into a position for examination. Resolutions comparable with traditional mounting techniques are attained. A side looking, Si(Li) detector increases the utility of the system by allowing simultaneous energy dispersive x-ray microanalysis. The entire detector assembly slips between the secondary electron detector and the sphere rolling capillaries to collect x-rays from the target. (ERA citation 05:011392)

UCRL-82752 PC **A02**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Electrostatic Levitation, Control and Transport in High Rate, Low Cost Production of Inertial Confinement Fusion Targets.
C. D. Hendricks, and W. L. Johnson. 25 May 79, 14p CONF-7910107-1
Contract W-7405-ENG-48
IEEE-IAS conference on "electrostatics", Cleveland, OH, USA, 1 Oct 1979.

Inertial confinement fusion requires production of power plant grade targets at high rates and process yield. A review of present project specifications and techniques to produce targets is discussed with special emphasis on automating the processes and combining them with an electrostatic transport and suspension system through the power plant target factory. (ERA citation 05:011393)

UCRL-82912 PC **A02**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Mechanism Design of the Thomson Scattering Diagnostic System for the TMX East Mirror Plug.
D. D. Lang, R. K. Goodman, S. L. Jenkins, J. A. Wilkerson, and J. L. Parkinson. 1 Nov 79, 5p CONF-791102-96
Contract W-7405-ENG-48
Symposium on engineering problems of fusion research, San Francisco, CA, USA, 13 Nov 1979.

This Thomson scattering diagnostic system is used to measure the electron temperature and density of the east mirror plug of the Tandem Mirror Experiment (TMX) at Lawrence Livermore Laboratory. The measurements are made by firing a high-power ruby laser pulse through the plasma where the electrons then re-radiate a small fraction of the light. Because of the velocity of the electrons, the wavelength of the re-radiated light is Doppler shifted. The width of the Doppler-shifted wavelength spectrum is a measure of the temperature of the electrons in the plasma, and the total amount of re-radiated light is proportional to the electron density. (ERA citation 05:014534)

UCRL-83234 PC **A02**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Automatic X-Ray Image Analysis and Sorting of Laser Fusion Targets.
R. M. Singleton, and D. E. Perkins. 21 Aug 79, 5p CONF-800208-1
Contract W-7405-ENG-48
Tropical meeting on inertial confinement fusion, San Diego, CA, USA, 26 Feb 1980.

A microcomputer-based x-ray image analysis system to select and measure laser fusion targets is described. This system positions a photographic plate in x and y, focuses a microscope image, digitizes and extracts measurements within seconds. (ERA citation 05:011394)

UCRL-83392 PC **A02**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Rapid Interferometric Sorting of Fusion Targets.
G. T. Reel, R. L. Woerner, D. L. Willenborg, and B. W. Weinstein. 21 Sep 79, 5p CONF-800208-8
Contract W-7405-ENG-48
Tropical meeting on inertial confinement fusion, San Diego, CA, USA, 26 Feb 1980.

A Mach-Zehnder interference microscope was automated which quickly characterizes and sorts transparent microspheres. It takes only 12 seconds to measure a 3 micron thick glass microsphere. (ERA citation 05:013193)

UCRL-83792 PC **A02**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Stellarmak a Hybrid Stellarator: Spheromak.
C. W. Hartman. 4 Jan 80, 6p CONF-791225-5
Contract W-7405-ENG-48
Symposium on compact toruses and energetic particle injection, Princeton, NJ, USA, 11 Dec 1979.

This paper discusses hybridization of modified Stellarator-like transform windings (T-windings) with a Spheromak or Field-Reversed-Mirror configuration. This configuration, Stellarmak, retains the important topological advantage of the Spheromak or FRM of having no plasma linking conductors or blankets. The T-windings provide rotational transformation in toroidal angle of the outer poloidal field lines, in effect creating a reversed B/sub Toroidal/ Spheromak or adding average B/sub T/ to the FRM producing higher shear, increased limiting beta , and possibly greater stability to kinks and tilt. The presence of field ripple in the toroidal direction may be sufficient to inhibit cancellation of directed ion current by electron drag to allow steady state operation with the toroidal as well as poloidal current maintained by neutral beams. (ERA citation 05:012837)

UWFDM-339 PC **A02**/MF **A01**
Wisconsin Univ.-Madison. Dept. of Nuclear Engineering.
Limiter Pumping System for Divertorless Tokamaks.
R. W. Conn, I. N. Sviatoslavsky, and D. K. Sze. Nov 79, 7p CONF-791102-97
Contract EY-76-S-02-2272
Symposium on engineering problems of fusion research, San Francisco, CA, USA, 13 Nov 1979.

A specially shaped toroidal belt limiter for high power tokamak systems is developed. The peak heat load is reasonable (approx. 200 - 400 W/cm exp 2), and a water cooling system is presented. A choked gap permits adequate pumping of plasma fuel and ash. (ERA citation 05:014579)

18B. Isotopes

AECL-6215 PC **A03**/MF **A01**
Atomic Energy of Canada Ltd., Chalk River (Ontario). Chalk River Nuclear Labs.
Heavy Water GS Process R and D Achievements.
A. R. Bancroft. Oct 78, 34p CONF-7806125-5
1978 annual conference of the Canadian Nuclear Association, Ottawa, Canada, 11 Jun 1978.
U.S. Sales Only.

R and D support of Canadian heavy water production plants during the past five years has involved mainly AECL and Ontario Hydro, and their contractors. Testing has been done in the production plants, in two pilot plants and in research laboratories on topics that include sieve tray design, in-plant behaviour of oil and sulfur and choice of antifoam agent to control excessive foaming. The benefits are increased production through higher plant flows and higher extraction of deuterium from the feed, less down time because of process problems and lower cost for materials used to control water chemistry. (Atomindex citation 10:463485)

COO-4318-2 PC **A03**/MF **A01**
Washington Univ., St. Louis, MO. Edward Mallinckrodt Inst. of Radiology.
Preparation of Gallium-68 Radiopharmaceuticals for Positron Tomography. Progress Report, November 1, 1978-October 31, 1979.
M. J. Welch. Jun 78, 26p
Contract EE-77-S-02-4318

Although the germanium-gallium generator is probably the only source of positron-emitting radionuclides that would enable the wide application of positron tomography, the generator system in use suffers from several major disadvantages. The most important of these is that the generator is eluted with EDTA, and EDTA forms a very strong chelate with gallium. In order to produce radiopharmaceuticals other than gallium-68 EDTA it is necessary to break the stable EDTA complex and remove all the EDTA. A new generator system using a solvent extraction system which will produce gallium-68 8-hydroxyquinoline, a weak chelate has been developed. Using this agent, several gallium-68 radiopharmaceuticals have been synthesized and tested in vitro and in vivo. Attempts have been made using polarographic and chromatographic techniques to investigate the stability of gallium-68 complexes with a series of cryptates. (ERA citation 05:010441)

INIS-mf-4984 PC **A03**/MF **A01**
Institutul de Fizica si Inginerie Nucleara, Bucharest (Romania).
Standardization of Low Energy beta and beta-gamma Complex Emitters by the Tracer and the Efficiency Extrapolation Methods.
Thesis (D.S.),
M. Sahagia. 1978, 26p
In Romanian.
U.S. Sales Only.

The absolute standardization of radioactive solutions of low energy beta emitters and beta-gamma emitters with a high probability of disintegration to the ground state is described; the tracer and the efficiency extrapolation methods were used. Both types of radionuclides were mathematically and physically treated in an unified manner. The theoretical relations between different beta spectra were calculated according to Williams' model and experimentally verified for: exp 35 S + exp 60 Co, exp 35 S + exp 95 Nb, exp 147 Pm + exp 60 Co, exp 14 C + exp 95 Nb and two beta branches of exp 99 Mo. The optimum range of beta efficiency variation was indicated. The basic supposition that all beta efficieny tend to unity in the same time was

experimentally verified, using two exp 192 Ir beta branches. Four computer programs, written in the FORTRAN IV language, were elaborated, for the adequate processing of the experimental data. Good precision coefficients according to international standards were obtained in the absolute standardization of exp 35 S, exp 147 Pm, exp 99 Mo solutions. (Atomindex citation 10:461855)

PNL-SA-6601 PC **A02**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Rapid Nondestructive Plutonium Isotopic Analysis.
J. E. Fager, and F. P. Brauer. 1978, 7p CONF-780522-11
Contract EY-76-C-06-1830
ANS topical meeting, Williamsburg, VA, USA, 15 May 1978.

Methods for plutonium isotopic measurements have been evaluated for nuclear safeguards inventory verification. A mobile, real-time, nondestructive assay, gamma-ray spectrometric measurement system has been assembled, moved and operated at several nuclear storage facilities to perform rapid, real-time plutonium isotopic measurements on Pu metal, Pu nitrate and Pu oxide. (ERA citation 05:010410)

RAND/R-2427-DOE PC **A06**/MF **A01**
RAND Corp., Santa Monica, CA.
International Arrangements for Uranium Enrichment.
M. Mihalka, M. Miller, and K. A. Solomon. Sep 79, 108p
Contract EN-77-C-01-6139

Current international arrangements for the enrichment of uranium are discussed. Possible developments in those arrangements as a result of apparent trends in the market for enrichment services and technologies are examined. Recommendations to ensure a stable system for the supply of nuclear fuels without markedly increasing the likelihood and risk of future proliferation of nuclear weapons are included. (ERA citation 05:013126)

UCRL-15133 PC **A04**/MF **A01**
Energy Technology Engineering Center, Canoga Park, CA.
High-Voltage Power Supply System for Laser Isotope Separation.
E. C. Ketaily, R. P. Buckner, and R. L. Uhrik. 26 Jun 79, 55p SANL-707-101
Contract W-7405-ENG-48

This report presents several concepts for Laser High-Voltage Power Supply (HVPS) Systems for a Laser Isotope Separation facility. Selection of equipments and their arrangement into operational systems is based on proven designs and on application concepts now being developed. This report has identified a number of alternative system arrangements and has provided preliminary cost estimates for each. The report includes a recommendation for follow-on studies that will further define the optimum Laser HVPS Systems. Brief descriptions are given of Modulator/Regulator circuit trade-offs, system control interfaces, and their impact on costs. (ERA citation 05:012234)

Y/DA-6671 PC **A03**/MF **A01**
Oak Ridge Y-12 Plant, TN.
Argon Gas Scattering Cell to Protect Windows from Uranium Vapor.
J. R. McNeely. 19 Feb 76, 29p
Contract W-7405-ENG-26

The efficiency of an argon gas scattering cell for attenuating uranium vapor was measured. Attenuation efficiencies up to 0.9997 of the incident vapor intensity were observed with a gas scattering cell 15.24 cm in length and 1.05 cm in diameter (ID). Cell argon densities were on the order of 10 exp 13 to 10 exp 14 atoms-cm exp -3 . (ERA citation 05:013129)

18C. Nuclear Explosions

SAND-79-1002 PC **A03**/MF **A01**
Sandia Labs., Albuquerque, NM.
Prediction of Ground Motion from Nuclear Weapons Tests at NTS.
L. J. Vortman. Nov 79, 48p
Contract EY-76-C-04-0789

Ground motion data from underground nuclear detonations during FY78 were added to data from earlier detonations; the data were used to formulate a tentative equation for predicting ground motion at the Nevada Test Site. Additional measurements to explore an unexplained seismic anomaly in Jackass Flats are described. Methods used in automatic processing of ground motion data are explained. (ERA citation 05:010502)

UCID-18535 PC **A05**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Excavation of a Qattara Canal in Egypt: Two-Dimensional Nuclear Cratering Calculations.
J. B. Bryan, D. E. Burton, L. A. Lettis, Jr., A. L. Bruce, and L. R. Moreno. Jan 80, 80p
Contract W-7405-ENG-48

A series of single-charge nuclear cratering calculations were performed. Results from these calculations are being used in a study of the technical feasibility of the Qattara Project. The project would use nuclear explosives with yields ranging between about 200 and 1750 kilotons to excavate a canal about 73 km long connecting the Mediterranean Sea with the below sea-level Qattara Depression in northwestern Egypt. Computer simulations of explosive excavations were carried out at four locations near the proposed Qattara alignment. Holes were drilled in Egypt at these locations to depths of 372, 514, 632, and 701 m, respectively, to provide geophysical information needed to properly characterize each site for computer calculations. The calculated results for ground motion, particle velocity, and crater dimensions for these nuclear excavations are presented. (ERA citation 05:014143)

UCRL-52856 PC **A04**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
ISC Events from 1964 to 1976 at and Near the Nuclear Testing Ground in Eastern Kazakhstan.
H. C. Rodean. 17 Oct 79, 60p
Contract W-7405-ENG-48

Seismic events from 1964 to 1976 at and near the Nuclear Testing Ground (NTG) in Eastern Kazakhstan was studied using data published by the International Seismological Center (ISC) in the United Kingdom. During this period, the ISC detected 129 events concentrated in three testing areas within the NTG. The detection performance of the network of stations that reported to the ISC was estimated during these years, and used the performance assessment to estimate the number of events within a magnitude range that may have been missed by the ISC. In addition, the apparent origin times of these events was examined with respect to their identity (earthquake or explosion), the relations between errors of calculated origin time and location, the apparent Soviet practice for timing the detonation of explosions, and the geophysical significance of the mean origin times within the minute. The identity of event 760320 is considered on the basis of its ISC origin time and location, the results of studies by other investigators, and its location close to a major fault that is clearly visible in Landsat imagery. (ERA citation 05:010503)

UCRL-52873 PC **A03**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Computer Modeling of the Cabriolet Event.
M. Kamegai. 26 Nov 79, 35p
Contract W-7405-ENG-48

Computer modeling techniques are described for calculating the results of underground nuclear explosions at depths shallow enough to produce cratering. The techniques are applied to the Cabriolet Event, a well-documented nuclear excavation experiment, and the calculations give good agreement with the experimental results. It is concluded that, given data obtainable by outside observers, these modeling techniques are capable of verifying the yield and depth of underground nuclear cratering explosions, and that they could thus be useful in monitoring another country's compliance with treaty agreements on nuclear testing limitations. Several important facts emerge from the study: (1) seismic energy is produced by only a fraction of the nuclear yield, a fraction depending strongly on the depth of shot and the mechanical properties of the surrounding rock; (2) temperature of the vented gas can be predicted accurately only if good equations of state are available for the rock in the detonation zone; and (3) temperature of the vented gas is strongly dependent on the cooling effect, before venting, of mixing with melted rock in the expanding cavity and, to a lesser extent, on the cooling effect of water in the rock. (ERA citation 05:014153)

18D. Nuclear Instrumentation

AECL-6186 PC **A12**/MF **A01**
European Organization for Nuclear Research, Geneva (Switzerland).
1978 CERN School of Computing.
C. Verkerk. Nov 78, 254p
1978 CERN school of computing, Jadwisin, Poland, 28 May 1978.
U.S. Sales Only.

A separate abstract was prepared for each paper presented. (Atomindex citation 10:461903)

AECL-6407 PC **A03**/MF **A01**
Atomic Energy of Canada Ltd., Chalk River (Ontario). Chalk River Nuclear Labs.
Two Survey Meters for Measuring Low gamma -Ray Dose Rates.
A. R. Jones. Jan 79, 32p
U.S. Sales Only.

Two low-level survey meters have been developed which have numerical displays. The first is of the light-emitting diode (LED) type. The second is a liquid crystal display (LCD). The design of both instruments is described and results of measurements of performance are presented. They measure gamma dose rates from background up to 2 mrad/h (20 mu Gy/h) for gamma -rays in the energy range 0.05-1.25 MeV. They can be used at temperatures between -20 deg C and +50 deg C. Statistical accuracy and battery life both depend upon a number of factors and this dependence is shown. A later section describes the intended application of the survey meters. An appendix describes the circuit adjustments which are necessary and when they must be made. (Atomindex citation 10:461832)

AERE-R-8967 PC **A02**/MF **A01**
UKAEA Atomic Energy Research Establishment, Harwell (England).
Measurement of the Pulse Height Distribution of a Lithium Glass Scintillator at Different Neutron Energies.
T. J. Haste. Oct 78, 20p
U.S. Sales Only.

The shape of the pulse-height response of a lithium-glass scintillator detector to neutrons has been measured in the range of neutron energies from 33 eV to 1.170 MeV using time-of-flight techniques. The variation of the width and mean pulse height of the distributions with neutron energy has been studied. An attempt has been made to interpret the spectra obtained at 'black resonances' in the time-of-flight spectrum. The significance of these results with regard to the 'black resonance' method of background determination is discussed and the need for further studies emphasised. (Atomindex citation 10:463720)

BNL-26862 PC **A02**/MF **A01**
Brookhaven National Lab., Upton, NY.
Relativistic Rise Measurement by Cluster Counting Method in Time Expansion Chamber.
P. Rehak, and A. H. Walenta. Oct 79, 6p CONF-791037-20
Contract EY-76-C-02-0016
IEEE nuclear science symposium, San Francisco, CA, USA, 17 Oct 1979.

A new approach to the measurement of the ionization energy loss for the charged particle identification in the region of the relativistic rise was tested experimentally. The method consists of determining in a special drift chamber (TEC) the number of clusters of the primary ionization. The method gives almost the full relativistic rise and narrower

landau distribution. The consequences for a practical detector are discussed. (ERA citation 05:010485)

BNL-26893 PC **A02**/MF **A01**
Brookhaven National Lab., Upton, NY.
Brookhaven National Laboratory's Multiparticle Spectrometer Drift Chamber System.
A. Etkin, and M. A. Kramer. 1979, 6p CONF-791037-22
Contract EY-76-C-02-0016
IEEE nuclear science symposium, San Francisco, CA, USA, 17 Oct 1979.

A system of drift chambers is being built to replace the present spark chambers in the Brookhaven National Laboratory's Multiparticle Spectrometer. This system will handle a beam of approx. 3 million particles per second and have a resolution of 200 mu m. A summary of the status of the chambers and the custom integrated circuits is presented. The data acquisition system is described. Prototype chambers have been built and tested with results that are consistent with the expected chamber properties. (ERA citation 05:014112)

CEA-CONF-4214 PC **A02**/MF **A01**
CEA Centre d'Etudes Nucleaires de Saclay, Gif-sur-Yvette (France). Dept. de Biologie.
Quantitative Studies with the gamma-Camera: Correction for Spatial and Energy Distortion.
F. Soussaline, A. E. Todd-Pokropek, and C. Raynaud. 1977, 18p CONF-770685-4
International conference on information processing in medical imaging, Nashville, TN, USA, 27 Jun 1977.
U.S. Sales Only.

The gamma camera sensitivity distribution is an important source of error in quantitative studies. In addition, spatial distortion produces,apparent variations in count density which degrades quantitative studies. The flood field image takes into account both effects and is influenced by the pile-up of the tail distribution. It is essential to measure separately each of these parameters. These were investigated using a point source displaced by a special scanning table with two X, Y stepping motors of 10 micron precision. The spatial distribution of the sensitivity, spatial distortion and photopeak in the field of view were measured and compared for different setting-up of the camera and PM gains. A correction technique to improve the results in quantitative studies has been tested using a continuously matched energy window at every point within the field. A method for correcting spatial distortion is also proposed, where, after an adequately sampled measurement of this error, a transformation can be applied to calculate the true position of events. (Atomindex citation 10:463742)

CONF-791049-23 PC **A02**/MF **A01**
Argonne National Lab., IL.
Gamma Spectrometry and Calibration Methods Used in Neutron Dosimetry.
R. L. Malewicki, R. R. Heinrich, and R. J. Popek. 1979, 11p
Contract W-31-109-ENG-38
23. conference on analytical chemistry in energy technology, Gatlinburg, TN, USA, 9 Oct 1979.

Neutron activation rates are calculated from measured gamma-ray spectral data obtained from calibrated lithium drifted germanium (Ge(Li)) detectors. The calibration techniques, which include energy, efficiency, pulse height analyzer data reduction, and geometry factors, are discussed. Problems encountered when analyzing highly radioactive samples, specifically random coincidence summing, sample size, air absorption, and use of absorbers, are also discussed briefly. To illustrate the accuracy achievable, the reduction of gamma-ray spectral data and the calculation of reaction rates by three independent laboratories are presented for both fission and nonfission foils to a precision of +-1 to 2% (1sigma). The appiication of these neutron activation rates to neutron dosimetry is discussed. An unfolded neutron spectrum is illustrated, along with energy sensitivity limits for many reactions of dosimetry interest. (ERA citation 05:012365)

COO-1671-78 PC **A02**/MF **A01**
Nebraska Univ., Lincoln.
Theory of RBE. Progress Report, 1 January-31 December 1978.
R. Katz. Sep 78, 13p
Contract EY-76-S-02-1671

The shapes of the blackness-exposure curves of special nuclear emulsions after exposure to x-rays of 15-150 kvp have been found to remain constant, at all applied voltages. Since the shapes of these curves mimic those of biological cells (for cell killing vs. exposure), no change is expected in the RBE of low LET radiations at low dose levels. This finding disagrees with radiobiological findings in which the RBE of gamma-rays relative to x-rays increased at low dose, and was expected to approach 4. A minimal model of a heavy ion beam incorporating secondary and tertiary particle production has been constructed, in support of our investigations of relative effectiveness. The model gives good agreement with depth-dose curves from He to Ar for 8-30 cm of penetration in water. When applied to the survival of T-1 kidney cells using the parameters of the theory of RBE assigned from earlier work and slightly modified to accomodate recently attained levels of hypoxia, good agreement is found with measured values of the RBE and OER in Ar beams, for these cells. Secondary particle distribution alters the depth dose distribution dramatically, but has a much smaller effect on these biological parameters. To illustrate the potential application of the model to heavy particle therapy, we have designed a ridge filter, and find once again that it will be impossible to achieve isoeffect volumes for both oxic and hypoxic cells in a single port irradiation. Where possible, the preferred mode for heavy ion therapy must be symmetric cross-firing, where it is relatively simple to achieve isoeffect volumes for both oxic and hypoxic cells. (ERA citation 05:012353)

COO-2184-47 PC **A02**/MF **A01**
Princeton Univ., NJ.
Nuclear Chemistry Project. Progress Report, Janary 1, 1979-December 31, 1979.
21 Dec 79, 25p
Contract EY-76-S-02-2184

The first on-line operation of the Princeton electron spectrometer was achieved and its capability for fast life time measurements demonstrated. The first operation of the heavy ion source was achieved and beams of 75 meV exp 12 C exp +4 ions and 37 MeV exp 6 Li exp +2 ions demonstrated. The capability of the isotope separator to provide pure mass separated samples of radioisotopes is being utilized for three different applications. The very weak electron capture branch of 19-s krypton 81m to bromine 81 was studied. This transition probability is of crucial importance for a possible solar neutrino detection method based on natural bromine. Lead 202 has been prepared and mass separated for optical hyperfine spectroscopic studies. The isotope shift shift which measures the second moment, < r exp 2 >, of the nuclear charge indicates the more neutron deficient lead isotopes are becoming increasingly soft toward nuclear deformation. (ERA citation 05:010481)

GKSS-78/E/31 PC **A02**/MF **A01**
Gesellschaft fuer Kernenergieverwertung in Schiffbau und Schiffahrt m.b.H., Geesthacht-Tesperhude (Germany, F.R.).
Self-Powered Detectors with Thullum Emitters.
P. Haller, E. Klar, and W. Krull. 1978, 3p
In German.
U.S. Sales Only.

Apart from fission chambers also self-powered (SPN) detectors are used to measure the neutron flux density in power reactor cores. With the present results, it should be possible to optimize the design of SPN detectors with Tm emitters in order to keep the parasite current components low enough. This detector would have a good useful signal/spurions signal ratio even during longer periods of use in the reactor core. (Atomindex citation 10:437970)

HEDL-SA-1782-FP PC **A02**/MF **A01**
Hanford Engineering Development Lab., Richland, WA.
Reactor gamma Spectrometry: Status.
R. Gold, and B. J. Kaiser. 1979, 11p CONF-791051-13
Contract EY-76-C-14-2170
ASTM-EURATOM symposium on reactor dosimetry, Ispra, Italy, 1 Oct 1979.

Current work is described for Compton Recoil Gamma-Ray Spectrometry including developments in experimental technique as well as recent reactor spectrometry measurements. The current status of the method is described concerning gamma spectromoetry probe design and response characteristics. Emphasis is given to gamma spectrometry work in US LWR and BR programs. Gamma spectrometry in BR environments are outlined by focussing on start-up plans for the Fast Test Reactor (FTR). Gamma spectrometry results are presented for a LWR pressure vessel mockup in the Poolside Critical Assembly (PCA) at Oak Ridge National Laboratory. (ERA citation 05:009021)

IAEA-R-1558-F PC **A03**/MF **A01**
International Atomic Energy Agency, Vienna (Austria).
Testing of a gamma Absorptiometer. Final Report for the Period 1 November 1974 - 31 December 1976.
A. Whittaker. Apr 78, 33p BNFL-MEMO-715(W)
U.S. Sales Only.

The memorandum describes work carried out by BNFL (Windscale) to test the applicability of a 4 pi gamma absorptiometer to the measurement of the concentration of plutonium in plant liquor in a reprocessing environment. Procedures used to test the long and short term stability, temperature sensitivity and build-up of interfering solids are described and results are quoted. Techniques evolved to combat the marked instabilities are described along with those used to calibrate the instrument with standard solutions of plutonium. This calibration showed a marked deviation from linearity and investigation of this effect indicated that it was primarily due to interference from Am-241. An in depth, investigation of the americium problem is described and the use of the instrument for the measurement of plutonium is discussed. (Atomindex citation 10:463748)

IFVE-OEA-78-150 PC **A02**/MF **A01**
Gosudarstvennyi Komitet po Ispol'zovaniyu Atomnoi Energii SSSR, Serpukhov. Inst. Fiziki Vysokikh Energii.
Module Translation in the FAUST System.
Yu. N. Ivanov, A. Yu. Sychev, and E. D. Shcherbakov. 1978, 7p
In Russian.
U.S. Sales Only.

The structure of module translation system on the ICL-1903A computer in the FAUST system, meant for processing the bubble chamber pictures, is described. The translation procedure is carried out by the TRAN controlled program, which brings about the complex reprocessing of the module initial text into the binary program. The translation procedure goes through several steps, each of them is carried out by a series of subcontrolled programs. The system makes it convenient to work on the EXECUTIVE level and allows the most efficient utilization of the supplier software. (Atomindex citation 10:477546)

IFVE-OEIPK-77-56 PC **A02**/MF **A01**
Gosudarstvennyi Komitet po Ispol'zovaniyu Atomnoi Energii SSSR, Serpukhov. Inst. Fiziki Vysokikh Energii.
Program for Data Analysis of HPD System.
A. A. Borovikov, V. V. Bryzgalov, V. P. Voevodin, S. A. Gumenyuk, and L. F. Zaitsev. 1977, 9p
In Russian.
U.S. Sales Only.

The V3MT program has been written to elicit error sources and malfunction diagnostics at various stages of film passage through HPD system from the bubble chambers. The V3MT program permits to carry on man-machine dialogue on five logically completed subjects called program levels. The program graphically represents on an active display screen the data obtained at various stages of film information processing on the HPD-device permiting thus to control promptly the measuring process at all its stages. (Atomindex citation 10:421686)

ITEF-135(1978) PC **A03**/MF **A01**
Gosudarstvennyi Komitet po Ispol'zovaniyu Atomnoi Energii SSSR, Moscow. Inst. Teoreticheskoi i Eksperimental'noi Fiziki.
Program for Geometric Reconstruction of the Antineutrino Experiment Events in the FNAL 15 Ft Bubble Chamber.
Yu. P. Arpishkin, T. S. Budanova, and E. A. Grebenikov. 1978, 28p
In Russian.
U.S. Sales Only.

The program of geometric reconstruction of events registered in the 15 ft. bubble chamber is described. The program is composed of geometric modules, written in the HYDRA system (CERN), difined in conformity with the requirements of an antineutrino experiment and is adapted for a BESM-6 computer. As the full length of the program is about 48.4 K words, it has been subdivided into 7 segments. The scheme of succession of these segments work is presented and their brief descriptions are given. The program is processing events containing not more than 19 various tracks. The processing time of two-beam event according to the geometric reconstruction program is 17 s. (Atomindex citation 10:477544)

JINR-10-11526 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Nuclear Problems.
Display Using in the System for MIS Image Processing by the HPD Scanner.
N. D. Dukusar, and I. Ruzicka. 1978, 16p
In Russian.
U.S. Sales Only.

The problems related to the software and application of the display with the light pen when measuring and processing the images from MIS (JINR) using the HPD scanner are considered. The created software reflects the event on the display screen and is an effective tool for checking the quality of operation of the programmes and apparatuses. (Atomindex citation 10:446141)

JINR-10-9977 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Computing Techniques and Automation.
On-Line Filtration in the "Spiral Meter" Scanning System.
M. Zhenei, Z. Zamori, V. M. Kotov, and M. Salai. 1976, 7p
In Russian.
U.S. Sales Only.

The basic features are considered of the program intended for filtration of the scanning data on the low-capacity computer, type TPA. Filtration is performed directly in the course of measurements, thereby enabling the operator to participate in picture processing. Transmission of the scanning data into the TPA computer memory is accomplished with the aid of the conjugation unit employing the FIFO circuits. (Atomindex citation 10:421695)

KEK-77-25 PC **A04**/MF **A01**
National Lab. for High Energy Physics, Oho (Japan).
KEK 1 M Hydrogen Bubble Chamber.
Y. Doi, O. Araoka, K. Hayashi, Y. Hayashi, and H. Hirabayashi. Mar 78, 54p
U.S. Sales Only.

A medium-sized hydrogen bubble chamber has been constructed at the National Laboratory for High Energy Physics, KEK. The bubble chamber has been designed to be operated with a maximum rate of three times per half a second in every two second repetition time of the accelerator, by utilizing a hydraulic expansion system. The bubble chamber has a one meter diameter and a visible volume of about 280 l. A three-view stereo camera system is used for taking photographic pictures of the chamber. A 2 MW bubble chamber magnet is constructed. The main part of the bubble chamber vessel is supported by the magnet yoke. The magnet gives a maximum field of 18.4 kG at the center of the fiducial volume of the chamber. The overall system of the KEK 1 m hydrogen bubble chamber facility is described in some detail. Some operational characteristics of the facility are also reported. (Atomindex citation 10:445605)

KFKI-1978-42 PC **A02**/MF **A01**
Kozponti Fizikai Kutato Intezet, Budapest (Hungary).
Thermal and Intermediate Neutron Flux Density Determination for Accident Dosimetry Purposes Using Thick Gold Foils.
J. Palfalvi. Jun 78, 17p
U.S. Sales Only.

Details are given of a thermal and intermediate neutron detector consisting of two thick gold foils which sandwich a cadmium foil. Measurements of the beta radiation from both sides of each gold foil provide estimates of the neutron fluxes. Counting rates to neutron flux conversion factors are given in four tables. These factors can be used for all cases when the beta-ray counting geometry is similar to that described here. (Atomindex citation 10:463733)

LA-UR-79-2760 PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
Americium Assay Instrument.
R. S. Marshall. 1979, 7p CONF-791049-17
Contract W-7405-ENG-36
23. conference on analytical chemistry in energy technology, Gatlinburg, TN, USA, 9 Oct 1979.

A simple in-line americium assay instrument (AAI) was installed at an americium recovery process area at LASL for use in process development and for providing process control information. The AAI counts 59.5-keV exp 241 Am gamma rays, using a NaI(T1) detector and Eberline SAM II electronics. It has a useful range of 3 x 10 exp -5 to 10 g Am/l and does not suffer from plutonium interference. Comparative analyses of samples assayed in the AAI and samples assayed by the LASL Analytical Laboratory show a combined relative standard deviation of 14%. (ERA citation 05:008183)

LA-7987-MS PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
Contribution of Carbon Interactions to the Neutron Counting Efficiency of Organic Scintillators.
M. Drosg, D. M. Drake, and P. Lisowski. Jan 80, 6p
Contract W-7405-ENG-36

The neutron counting efficiency of an NE-213 detector was measured for neutron energies up to 15 MeV using biases at 0.3- and 2.0-MeV neutron energies. For the lower bias, nonelastic carbon interactions contribute appreciably to the efficiency at energies as low as 5.5 MeV. (ERA citation 05:014107)

LBL-10246 PC **A02**/MF **A01**
California Univ., Berkeley. Lawrence Berkeley Lab.
Instructions for Operating LBL Passive Environmental Radon Monitor (PERM).
M. L. Boegel, W. W. Nazaroff, and J. G. Ingersoll. Aug 79, 17p EEB-Vent-79-14
Contract W-7405-ENG-48

The Passive Environmental Radon Monitor (PERM) is used to assess the impact of energy conservation in buildings, with reduced ventilation. Reduced ventilation can lead to increased concentration of air contaminants. The instrument operates on the principle of electrostatic collection of exp 218 Po ions. Cumulative alpha activity collects on the electrode and is detected with a lithium fluoride thermoluminescent detector. (ERA citation 05:012366)

LBL-9366 PC **A02**/MF **A01**
California Univ., Berkeley. Lawrence Berkeley Lab.
PEP-14 Data Acquisition System.
P. B. Madden, D. Besset, S. J. Freedman, F. A. Harris, and C. P. Horne. Jun 79, 14p CONF-791215-6
Contract W-7405-ENG-48
DECUS 1979 fall symposium, San Diego, CA, USA, 10 Dec 1979.

A real-time software system was developed for the VAX 11/780 which employs ten processes cooperating concurrently in the task of data acquisition and on-line analysis for the Free Quark Search experiment at the new colliding beam storage ring facility (PEP) located at the Stanford Linear Accelerator Center. The system utilizes most of the resources available to the applications programer under VAX 11/780 VMS, including interprocess communication via mailbox, global event flag cluster, and mapped global section, and is written primarily in FORTRAN IV PLUS with time-critical portions in MACRO-11. A discussion of the system architecture, implementation, and performance is given. 6 figures, 1 table. (ERA citation 05:012375)

LUIP-7901 PC **A02**/MF **A01**
Lund Univ. (Sweden).
Experimental and Theoretical Track Widths of Low Energy Heavy Ions in Nuclear Emulsion.
G. Joensson. Jan 79, 17p LUNFD6-NFFK-7001
U.S. Sales Only.

Track widths of stopping nuclei are measured in Ilford G5 emulsions by a filar micrometer method on the last 400 mu m residual range of the tracks. The nuclei have charges of $5 <= Z <= 26$ and velocities beta < 0.25. The track widths are compared with photometric profile widths and with theoretical widths given by Katz and coworkers and by Bizzetti and Della Corte. The filar micrometer measurement indicates that the track width is proportional to the product Z sub(eff) x B in the measured charge and velocity interval. (Atomindex citation 10:461830)

LUTFD2-TFKF-5004 PC **A03**/MF **A01**
Lund Univ. (Sweden).
Parallel Plate Avalanche Counter (PPAC).
T. Aakesson. 1978, 29p
In Swedish.
U.S. Sales Only.

The parallel plate avalanche counter (PPAC) is a new type of detector used for the detection of ionizing particles. In this report the developing work performed at the University of Lund, Sweden, with such detectors is described. Furthermore some experimental arrangements, in which a PPAC is used, are described. Possible improvements of the counters are also suggested. (Atomindex citation 10:461813)

NVO-0410-53 PC **A02**/MF **A01**
Reynolds Electrical and Engineering Co., Inc., Las Vegas, NV.
Technical Evaluation of a Fast Neutron Dosimeter.
M. W. Lantz, and W. M. Quam. Nov 79, 17p
Contract EY-76-C-08-0410

The albedo-neutron badge as used by the Reynolds Electrical and Engineering Co., Inc., at the US Department of Energy's Nevada Test Site and other locations is described. The badge, using TLD's has proven superior to other devices in terms of reliability and range of neutron energies detectable. The initial calibrations of the badge for the sources typically employed by the users of the system are provided and the equations needed to calculate an individual's dose due to exposure to these sources are listed. Laboratory tests of the badge are tabulated and the detection limit of the system is discussed. (ERA citation 05:009019)

ORNL/CSD/TM-101 PC **A04**/MF **A01**
Oak Ridge National Lab., TN.
Computer-Controlled Neutron Time-of-Flight Spectrometer. Part II.
S. H. Merriman. Dec 79, 54p
Contract W-7405-ENG-26

A time-of-flight spectrometer for neutron inelastic scattering research has been interfaced to a PDP-15/30 computer. The computer is used for experimental data acquisition and analysis and for apparatus control. This report was prepared to summarize the functions of the computer and to act as a users' guide to the software system. (ERA citation 05:009022)

ORNL-5606 PC **A03**/MF **A01**
Oak Ridge National Lab., TN.
Irradiated-Microsphere Gamma Analyzer (IMGA): An Integrated System for HTGR Coated Particle Fuel Performance Assessment.
M. J. Kania, and K. H. Valentine. Feb 80, 48p
Contract W-7405-ENG-26

The Irradiated-Microsphere Gamma Analyzer (IMGA) System, designed and built at ORNL, pro-

vides the capability of making statistically accurate failure fraction measurements on irradiated HTGR coated particle fuel. The IMGA records the gamma-ray energy spectra from fuel particles and performs quantitative analyses on these spectra; then, using chemical and physical properties of the gamma emitters it makes a failed-nonfailed decision concerning the ability of the coatings to retain fission products. Actual retention characteristics for the coatings are determined by measuring activity ratios for certain gamma emitters such as exp 137 Cs/ exp 95 Zr and exp 144 Ce/ exp 95 Zr for metallic fission product retention and exp 134 Cs/ exp 137 Cs for an indirect measure of gaseous fission product retention. Data from IMGA (which can be put in the form of n failures observed in N examinations) can be accurately described by the binomial probability distribution model. Using this model, a mathematical relationship between IMGA data (n,N), failure fraction, and confidence level was developed. To determine failure fractions of less than or equal to 1% at confidence levels near 95%, this model dictates that from several hundred to several thousand particles must be examined. The automated particle handler of the IMGA system provides this capability. As a demonstration of failure fraction determination, fuel rod C-3-1 from the OF-2 irradiation capsule was analyzed and failure fraction statistics were applied. Results showed that at the 1% failure fraction level, with a 95% confidence level, the fissile particle batch could not meet requirements; however, the fertile particle exceeded these requirements for the given irradiation temperature and burnup. (ERA citation 05:011894)

PAT-APPL-6-029 964 PC **A02**/MF **A01**
Department of Energy, Washington, DC.
Radiation Detection System.
Patent Application,
R. C. Whited. Filed 13 Apr 79, 17p
Contract EY-76-C-08-1183
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A system for obtaining improved resolution in relatively thick semiconductor radiation detectors, such as Hgl sub 2 , which exhibit significant hole trapping. Two amplifiers are used: the first measures the charge collected and the second the contribution of the electrons to the charge collected. The outputs of the two amplifiers are utilized to unfold the total charge generated within the detector in response to a radiation event. (ERA citation 05:019257)

RL-78-102 PC **A03**/MF **A01**
Science Research Council, Chilton (England). Rutherford and Appleton Labs.
Identification of Relativistic Charged Particles by Means of Ionisation Energy Loss in Proportional Counters. A New Approach.
J. E. Bateman. Dec 78, 27p
U.S. Sales Only.

A method is described of obtaining a useful degree of improvement in the particle discrimination capability of multiwire proportional counters. The normal multiple sampling technique using a suitable bias to combat the small magnitude of the relativistic rise in the ionization energy loss and the wide pulse height distributions obtained in thin gas counters requires a large number of samples for useful discrimination. In the method reported, this number is reduced by suppressing the delta ray contribution to the total charge pulse from the anode wire. A Monte Carlo model convoluting the 'delta ray suppressed' data from a one sample detector shows that when it is required to separate pions and electrons at 1 GeV/C with a detection efficiency for the electron of 90%, a 'suppressor' circuit can achieve a pion rejection ratio of 250:1 with 82 samples, whereas the truncated mean approach (lowest 70% of samples) requires 100 samples. (Atomindex citation 10:463703)

RL-78-103 PC **A03**/MF **A01**
Science Research Council, Chilton (England). Rutherford and Appleton Labs.
Electronics for Nuclear Magnetic Resonance Spectrometer.
A. R. Cash. Nov 78, 32p
U.S. Sales Only.

This report reviews the design criteria which need consideration when Q-meter spectrometers are used to measure the nuclear magnetic polarisation of targets for particle physics. Some of the physics principles that influence the spectrometer design are related and the spectrometer used on the K20 polarised target built at the Rutherford Laboratory is described. (Atomindex citation 10:463552)

SSI-1978-031 PC **A02**/MF **A01**
Statens Straalskyddsinstitut, Stockholm (Sweden).
Reference Radiation Source for Stability Control of Ionization Chambers Used for Soft X-Rays.
M. Reuthal. Oct 78, 25p
In Swedish.
U.S. Sales Only.

A reference radiation source for thin window ionization chambers, PTW-W type 7241 UI/K; used as secondary standards for soft X-radiation for therapy, has been constructed. The reference radiation source should be easy to handle. Furthermore it should be well shielded against any leakage radiation. Finally the variation of the signal from the ionization chamber due to small variations in the position of the chamber should be negligible. The constructed reference radiation source fulfill these conditions. (Atomindex citation 10:461854)

UCID-18294 PC **A02**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Limitations of Retarded (Bisulfite) X-Ray Film Processing.
J. P. Stoering, and C. Dittmore. 16 Oct 79, 6p
Contract W-7405-ENG-48

We demonstrate the limitations of using retarded (bisulfite) developer to abate film sensitivity of x-ray films that have been exposed to intense radiation. We compared the measured densities of a large number of Kodak Type-M x-ray film samples exposed to a known fluence of monochromatic x-rays. These film samples were processed in three separate batches of bisulfite developer mixed in the same proportions. We concluded that reproducible film-density information cannot be obtained using different batches of (bisulfite) developer solutions. (ERA citation 05:014109)

UCID-18516 PC **A04**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Photocathode Fatigue of L-24 PM Head Due to High Intensity Light Pulses.
K. F. Bailey. 8 Jan 80, 53p
Contract W-7405-ENG-48

The sensitivity of radiation detectors which utilizes photomultipliers was determined after exposing the multiplier phototubes to high intensity light pulses. Test results found that generally less than a 5% change was found. (ERA citation 05:014130)

UCRL-82657 PC **A02**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Development of a Personnel Neutron Dosimeter/Spectrometer.
R. V. Griffith, J. C. Fisher, L. Tommasino, and G. Zapparoli. 1980, 6p CONF-800304-6
Contract W-7405-ENG-48
International congress of the International Radiation Protection Association, Jerusalem, Israel, 8 Mar 1980.

A few inexpensive plastic track etch component, CR-39, polycarbonate, and LR-115 have been added to the albedo dosimeters. This will extend personnel neutron measurement capability, providing information to infer a four energy group spectrum, reduce the expected error in personnel dose assessment, and help clarify the ambiguity that results when personnel must work in more than one neutron facility during the monitoring period. (ERA citation 05:012367)

UNI-SA-67 PC **A02**/MF **A01**
United Nuclear Industries, Inc., Richland, WA.
Microprocessor Based Flux Wire Evaluation and Analysis System.
D. G. Peterson, H. Toffer, and S. P. Sapp. 1980, 16p CONF-800306-1
Contract EY-76-C-06-1857
International IECI conference, Philadelphia, PA, USA, 17 Mar 1980.

A novel application of a microprocessor as the heart of a sophisticated data processing and analysis system at the Hanford N Reactor has been developed. Flux wires which map the neutron density distribution in the reactor are analyzed using the microprocessor system. Evaluation of flux wire activity is used to generate reactor operating limits and to monitor localized neutron flux depressions in the core. (ERA citation 05:011916)

18E. Nuclear Power Plants

CEA-CONF-3950 PC **A03**/MF **A01**
CEA Centre d'Etudes Nucleaires de Saclay, Gif-sur-Yvette (France). Dept. des Etudes Mecaniques et Thermiques.
Description, Output and Development Prospects of a 750 exp 0 C Helium Direct Cycle Nuclear Power Plant with a Single Turbomachinery and Intermediate Cooling.
Z. P. Tilliette, B. Pierre, P. Jude, and J. Chaboseau. 1977, 40p CONF-770317-5
22. ASME international turbine conference, Philadelphia, PA, USA, 27 Mar 1977.
U.S. Sales Only.

The concept of a helium cycle nuclear power plant with a single turbomachinery located outside the P.C.R.V. (prestressed concrete reactor vessel) in a leaktight basement is being studied. Main features of the system are pointed out, as are the favourable aspects it offers for a satisfactory design of the plant, a high safety level, a good efficiency for electricity generation associated with a dry cooling tower and heat recovery in good conditions for heating or industrial purposes. Above all, the high technological credibility due to the temperature of 750 exp 0 C is worth being emphasized. A 750 exp 0 C/800 MW(e) power plant (2000 MW(t)) with one intercooling is presented as an example of a possible first generation of gas turbine HTGR. Development prospects for higher power levels, 1000/1200 MWe, are also investigated, at first with one but also with two intermediate coolings, taking into consideration the somewhat higher helium temperature. The net plant efficiencies, for electricity generation only, range from 40 to 45%. (Atomindex citation 09:411878)

COO-4954-1(V.1) PC **A14**/MF **A01**
United Engineers and Constructors, Inc., Philadelphia, PA.
Energy Economic Data Base (EEDB) Program: Phase I, Volume I. Final Report.
Dec 79, 306p UE/C-DOE-790930(V.1)
Contract EN-76-C02-4954

The Energy Economic Data Base Program, which deals with the development of cost data for nuclear and comparison electric power generating stations, provides periodic updates of technical and cost (capital, fuel, and operating and maintenance) information of significance to DOE. The information allows for evaluation and monitoring of US civilian nuclear power programs and provides a consistent means of evaluation the nuclear option against alternatives. Currently, the EEDB contains 6 nuclear electrical generating plant technical models and 5 comparison coal-fired electrical generating plant technical models. Each of these technical plant models is a complete conceptual design for a single unit, steam electric power generating station located on a standard, hypothetical Middletown site. A description of the site is provided in Appendix A-1 (Volume 2) for nuclear plants, and Appendix A-2 (Volume 2) for coal-fired plants. The EEDB also includes a conceptual design of a coal liquefaction plant for comparison purposes. Volume 1 provides a description of the current Data Base, as of September 30, 1978; gives assumptions and ground rules for the initial-cost update; summarizes the initial cost update, with cost results tabulated; details the initial update of the technical conceptual design, the capital cost, the quantities of commodities and their unit costs, and craft labor man hours and costs for each EEDB program model; and details the fuel-cycle-cost initial update and the operating- and maintenance-cost initial update. Finally, an extensive list of references and a glossary are presented. (ERA citation 05:012004)

COO-4954-1(V.2) PC **A17**/MF **A01**
United Engineers and Constructors, Inc., Philadelphia, PA.
Energy Economic Data Base (EEDB) Program: Phase I, Volume II. Final Report.
Dec 79, 386p UE/C-DOE-790930(V.2)
Contract EN-78-C-02-4954

This Volume II of Phase I of the Energy Economic Data Base Program contains appendices. Appendix A-1 provides the site and environmental data, derived from Appendix A of Guide for Economic Evaluation of Nuclear Reactor Plant Designs, USAEC Report NUS-531, modified to reflect current requirements. These data form the bases of the criteria used for designing the facility and for evaluating the routine and accidental release of radioactive liquids and gases to the environment. Appendix A-2 provides the site and environmental data as derived from Appendix A of NUS-531, and modified to reflect coal-plant siting, forming the bases of the criteria used for designing the facility and for evaluating the release of liquids and gases to the environment. A description of the topography of the hypothetical city, Middletown, is given. Appendix B provides an overall summary of the conclusions of NUS' work on all NUS tasks in support of the nuclear fuel-cycle work in Phase I. Appendix C-1 introduces the concepts involved and addresses methods of calculation of fixed charges applicable to investor-owned utilities, as used in the EEDB. Appendix C-2 consists of review and revision of each plant's fuel cycle and operating and maintenance costs in accordance with the EEDB update procedures. In Appendix D, NSSS Capital Costs for a Mature LMFBR Industry, much information is provided on plant description, cost estimate, comparison and discussion, drawings, and equipment list. (ERA citation 05:012005)

EUR-5650 PC **A03**/MF **A01**
Commission of the European Communities, Luxembourg.
Ardennes Nuclear Power Plant. Annual Report 1975.
May 77, 36p
In French.
U.S. Sales Only.

At the beginning of the year 1975 the nominal power of the nuclear plant of the Ardennes was brought from 950 up to 1040 MW(t), after a positive decision of the official safety organizations. Net energy produced: 2016 GWh, number of coupled hours: 6832 h, coefficient of availability: 75%, total number of standstills: 25. The functioning of the installations is, on the whole, very satisfying. Liquid wastes are clearly inferior to admissible maximum limits. The cost per KWh of the plant amounts to 5.57 French centimes. For the last 5 years net production has reached 9375 GWh, which means an average coefficient of availability of 76.7%. (Atomindex citation 10:423834)

GA-A-15575 PC **A02**/MF **A01**
General Atomic Co., San Diego, CA.
Nuclear Closed-Cycle Gas Turbine (HTGR-GT): Dry Cooled Commercial Power Plant Studies.
C. F. McDonald, and C. R. Boland. Nov 79, 17p
CONF-800302-2
Contract EY-76-C-03-0167-046
25. international gas turbine conference, New Orleans, LA, USA, 9 Mar 1980.

Combining the modern and proven power conversion system of the closed-cycle gas turbine (CCGT) with an advanced high-temperature gas-cooled reactor (HTGR) results in a power plant well suited to projected utility needs into the 21st century. The gas turbine HTGR (HTGR-GT) power plant benefits are consistent with national energy goals, and the high power conversion efficiency potential satisfies increasingly important resource conservation demands. Established technology bases for the HTGR-GT are outlined, together with the extensive design and development program necessary to commercialize the nuclear CCGT plant for utility service in the 1990s. This paper outlines the most recent design studies by General Atomic for a dry-cooled commercial plant of 800 to 1200 MW(e) power, based on both non-intercooled and intercooled cycles, and discusses various primary system aspects. Details are given of the reactor turbine system (RTS) and on integrating the major power conversion components in the prestressed concrete reactor vessel. (ERA citation 05:011880)

GA-A-15614 PC **A02**/MF **A01**
General Atomic Co., San Diego, CA. Preliminary Design Dept.
Turbomachinery Design Considerations for the Nuclear HTGR-GT Power Plant.
C. F. McDonald, and M. J. Smith. Nov 79, 20p
CONF-800302-3
Contract EY-76-C-03-0167-046
25. international gas turbine conference, New Orleans, LA, USA, 9 Mar 1980.

For several years, design studies have been under way in the USA on a nuclear closed-cycle gas turbine plant (HTGR-GT). Design aspects of the helium turbomachine portion of these studies are presented. Gas dynamic and mechanical design considerations are presented for helium turbomachines in the 400-MW(e) (non-intercooled) and 600-MW(e) (intercooled) power range. Design of the turbomachine is a key element in the overall power plant program effort, which is currently directed toward the selection of a reference HTGR-GT commercial plant configuration for the US utility market. A conservative design approach has been emphasized to provide maximum safety and durability. The studies presented for the integrated plant concept outline the necessary close working relationship between the reactor primary system and turbomachine designers. (ERA citation 05:011881)

IBK-1422 PC **A02**/MF **A01**
Institut za Nuklearne Nauke Boris Kidric, Belgrade (Yugoslavia).
Notes on Organization of Nuclear Power Station Construction.
B. Marsicanin. 1977, 13p
In Serbian.
U.S. Sales Only.

After a visit to some European nuclear power stations under construction and in operation, a short general view on this subject is given in this report. The progress in large, industrialised countries is considered as well as the relevant experience in developing countries. The new role of nuclear research institutes during construction and operation is pointed out and prospects of this cooperation evaluated. (Atomindex citation 10:421701)

INIS-mf-4351 PC **A03**/MF **A01**
Miljoeministeriet, Copenhagen (Denmark).
Possible Sites for Atomic Power Stations East of the Great Belt. Report from the Working Group on the Siting of Atomic Power Stations Set Up by the Ministry of the Environment.
May 78, 31p
In Danish.
U.S. Sales Only.

A report by the working group set up by the Danish Ministry of the Environment to deal with the siting of nuclear power stations. It deals with the possible siting of nuclear power stations east of the Great Belt, and considers 19 possible areas in detail. Factors such as: population structure, urban expansion, preservation of nature, cooling water, proximity of airfields, and the possibility of district heating from a power station on the site are taken into consideration. The working group recommends that steps should be taken to secure 6 areas for the possible siting of nuclear power stations east of the Great Belt. (Atomindex citation 09:395339)

INIS-mf-4428 PC **A02**/MF **A01**
Westinghouse Electric Corp., Pittsburgh, PA.
Nuclear Power Plant Construction Contracts: A Review of the Major Problems.
B. B. Crawford. 1977, 7p CONF-7710196-6
Nuclear Inter June 1977, Florence, Italy, 2 Oct 1977.
U.S. Sales Only.

No abstract available.

INIS-mf-4429 PC **A02**/MF **A01**
Central Electricity Generating Board, Manchester (UK). Scientific Services Dept.
United Kingdom Law on the Authorisation of Nuclear Power Stations.
R. Savinson. 1977, 8p CONF-7710196-12
Nuclear Inter June 1977, Florence, Italy, 2 Oct 1977.
U.S. Sales Only.

No abstract available.

INIS-mf-4436 PC **A03**/MF **A01**
Zentralstelle fuer Atomkernenergie-Dokumentation (ZAED), Eggenstein-Leopoldshafen (Germany, F.R.).
Siting and Public Acceptance.
P. De Lise. 1977, 30p CONF-7710196-7
In Italian.Nuclear Inter June 1977, Florence, Italy, 2 Oct 1977.
U.S. Sales Only.

No abstract available.

INIS-mf-4549 PC **A02**/MF **A01**
Comissao Nacional de Energia Nuclear de Brasil, Rio de Janeiro. Dept. de Reatores.
Licensing for the Construction of 'Almirante Alvaro Alberto' Nuclear Power Plant.
Sep 74, 24p
In Portuguese.
U.S. Sales Only.

The Brazilian Nuclear Energia Commission (Comissao Nacional de Energia Nuclear - CNEN) presents in Report n exp 0 51 of its Reactors Department all the requirements for the construction permit of 'Almirante Alvaro Alberto' Nuclear Power Plant. (Atomindex citation 09:418227)

INIS-mf-4697 PC **A11**/MF **A01**
Bonnenberg und Drescher Ingenieurgesellschaft m.b.H., Juelich (Germany, F.R.).
Stock-Taking of the Safety Design of the Nuclear Power Plant with HTR 1160 and the Radiation Exposure Connected with Its Operation. Phase 1.
H. P. Drescher, H. Geiser, P. Roedder, S. Dagbjartsson, and H. Ernst. Jun 76, 226p
In German.
U.S. Sales Only.

The study comprises: 1) environmental pollution due to radioactive emissions; 2) personnel exposure during operation, maintenance, inspection, and repair; 3) environmental pollution due to the closing of the fuel cycle; 4) safety requirements; 5) state of the art of safety design; 6) reliability analyses; 7) the importance of the testability of systems and components relevant for safety. (HP) 891 HP. (Atomindex citation 10:433734)

Juel-1516 PC **A05**/MF **A01**
Kernforschungsanlage Juelich G.m.b.H. (Germany, F.R.). Programmgruppe Systemforschung und Technologische Entwicklung.
Supply of Heat, Electricity and Synthesis Gas for Conurbations by Means of a Nuclear Energy Transport System Demonstrated by the Example of Cologne and Its Environs.
D. von Loiewski. Jun 78, 99p
In German.Thesis.
U.S. Sales Only.

The practical example of the Greater Cologne area is taken as a basis for demonstrating the fact that a nuclear energy transport system is able to contribute considerably to the coverage of energy needs of conurbations. For this purpose, those fractions in the energy demand of the Greater Cologne area, which can be covered by the output of the system involved, were investigated and extrapolated with a view to the earliest possible date of operation in the year 2000. The study also accounted for a substantial synthesis gas supply from an integrated coal gasification plant. The annual and daily characteristic of requirements was determined for the system in the light of the calculated market potentials allowing for the operation of three high-temperature reactors of 3000 MWth each. The technical details of the system were designed on the basis of these calculations. Taking into account any envisaged outage periods of the reactors and the storage possibilities of the system products, the load factor and the utilization rate of the system were calculated. It is demonstrated that also with a view to economic aspects it is not only possible but also advantageous to have the demand of district heat peaks covered by the system in question. (Atomindex citation 10:421606)

NUREG/CR-0891 PC **A09**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Seismic Review of Dresden Nuclear Power Station - Unit 2 for the Systematic Evaluation Program.
Technical rept.,
N. M. Newmark, W. J. Hall, R. P. Kennedy, J. D. Stevenson, and F. J. Tokarz. Apr 80, 198p

As part of Phase II of the Systematic Evaluation Program, a Senior Seismic Review Team performed a limited reassessment of the seismic resistance of the Dresden Nuclear Power Station, Unit 2. The reassessment focused generally on the reactor coolant pressure boundary and on those essential systems and components necessary to shut down the reactor safely and to maintain it in a safe shutdown condition following a postulated earthquake consistent with a zero period peak horizontal ground acceleration of 0.2 g. Unlike a design analysis, the reassessment was limited to structures and components deemed representative of generic classes. Conclusions and recommendations about the estimated ability of selected structures, equipment, and piping to withstand the postulated earthquake are presented.

NUREG-0053-SUP-10 PC **A10**/MF **A01**
Nuclear Regulatory Commission, Washington, DC.
Operation of North Anna Power Station Unit 2, Virginia Electric and Power Company, Supplement No. 10. Docket No. 50-339.
Safety evaluation rept. Mar 78-10 Apr 80.
Apr 80, 223p
See also Supplement No. 9, PB-279 287.

On June 4, 1976, the Nuclear Regulatory Commission issued its Safety Evaluation regarding the application for licenses to operate the North Anna Power Station, Units 1 & 2. The application was filed by the Virginia Electric and Power Company. Supplements 1 through 9 to the Safety Evaluation Report documented the resolution of several outstanding items. Since the time that Unit 1 was permitted to operate at 100 percent power, during April 1978, there have been changes in the NRC requirements and new licensing guidance has been put into effect. This supplement addresses the requirements for fuel loading and conducting low power testing of North Anna Unit 2 up to a power level of five percent of full power.

NUREG-0517-SUP-4 PC **A12**/MF **A01**
Nuclear Regulatory Commission, Washington, DC. Office of Nuclear Reactor Regulation.
Operation of Salem Nuclear Generating Station, Unit 2, Public Service Electric and Gas Company, et al. Docket No. 50-311. Supplement No. 4.
Safety evaluation rept. 1 Jan 79-18 Apr 80.
Apr 80, 260p

Public Service Electric and Gas Company filed an application for operating licenses on August 27, 1971 for the Salem Nuclear Generating Station, Units 1 and 2. The Safety Evaluation Report concerns the review of Units 1 and 2. This supplement addresses the requirements for fuel loading and conducting low power testing of Salem Nuclear Generating Station, Unit 2 up to a power level of five percent.

NUREG-0664 PC **A19**/MF **A01**
Nuclear Regulatory Commission, Washington, DC. Div. of Operating Reactors.
North Anna Power Station Unit 2 Technical Specifications. Appendix 'A' to License No. NPF-7.
Technical rept.,
P. C. Wagner. 1979, 440p

The North Anna Unit 2 Technical Specifications, which were prepared by the U. S. Nuclear Regulatory Commission, set forth the limits, operating conditions, and other requirements applicable to nuclear reactor facility operation as set forth in 10 CFR 50.36 for the protection of the health and safety of the public.

UCID-18142 PC **A02**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Technical Evaluation of the Proposed Changes in the Technical Specifications for Emergency Power Sources for the Big Rock Point Nuclear Power Plant.
V. R. Latorre. Dec 79, 10p
Contract W-7405-ENG-48

The technical evaluation is presented for the proposed changes to the Technical Specifications for emergency power sources for the Big Rock Point nuclear power plant. The criteria used to evaluate the acceptability of the changes include those delineated in IEEE Std-308-1974, and IEEE Std-450-1975 as endorsed by US NRC Regulatory Guide 1.129. (ERA citation 05:011875)

UCRL-15140 PC **A06**/MF **A01**
Engineering Decision Analysis Co., Inc., Irvine, CA.
Potential Seismic Structural Failure Modes Associated with the Zion Nuclear Plant. Seismic Safety Margins Research Program (Phase I). Project VI. Fragilities.
Oct 79, 111p
Contract W-7405-ENG-48

The Zion 1 and 2 Nuclear Power Plant consists of a number of structures. The most important of these from the viewpoint of safety are the containment buildings, the auxiliary building, the turbine building, and the crib house (or intake structure). The evaluation of the potential seismic failure modes and determination of the ultimate seismic capacity of the structures is a complex undertaking which will require a large number of detailed calculations. As the first step in this evaluation, a number of potential modes of structural failure have been determined and are discussed. The report is principally directed towards seismically induced failure of structures. To some extent, modes involving soil foundation failures are discussed in so far as they affect the buildings. However, failure modes involving soil liquefaction, surface faulting, tsunamis, etc., are considered outside the scope of this evaluation. (ERA citation 05:013550)

UCRL-15155 PC **A02**/MF **A01**
EG and G, Inc., San Ramon, CA. Energy Measurements Group.
Technical Evaluation of the Electrical, Instrumentation, and Control Design Aspects of the Override of Containment Purge Valve Isolation and Other Engineered Safety Feature Signals for the Joseph M. Farley Nuclear Power Plant.
D. B. Hackett. Nov 79, 14p EGG-1183-4146
Contract EY-76-C-08-1183

The technical evaluation is presented for the electrical, instrumentation, and control design aspects of the override of containment purge valve isolation and other engineered safety feature signals for the Joseph M. Farley nuclear power plant. The review criteria are based on IEEE Std-279-1971 requirements for the safety signals to all purge and ventilation isolation valves. (ERA citation 05:013551)

18F. Radiation Shielding and Protection

BMI-2039 PC **A03**/MF **A01**
Battelle Columbus Labs., OH.
Scale Model Drop Tests to Evaluate Impact Response of Lead and Uranium Shielded Radioactive Material Shipping Containers.
J. A. Hadden, and R. J. Burian. 30 Sep 79, 36p
Contract W-7405-ENG-92

The primary objective of the ongoing program is to develop for DOE/ECT data on and techniques for determining the dynamic impact response of radioactive material shipping container systems for environmental control and safety overview and assessment. Emphasis is placed on lead and uranium shielded radioactive material shipping containers although many of the techniques and results have a general application to the safety evaluation of other energy material shipping container systems, such as those for tritium, fuel cells and LNG. (ERA citation 05:012281)

CEA-CONF-3952 PC **A03**/MF **A01**
CEA Centre d'Etudes Nucleaires de Cadarache, 13 - Saint-Paul-les-Durance (France). Dept. des Reacteurs a Eau.
Approximate Solutions of the Two-Dimensional Integral Transport Equation by Collision Probability Methods.
R. Sanchez. 1977, 47p
U.S. Sales Only.

A set of approximate solutions for the isotropic two-dimensional neutron transport problem has been developed using the Interface Current formalism. The method has been applied to regular lattices of rectangular cells containing a fuel pin, cladding and water, or homogenized structural material. The cells are divided into zones which are homogeneous. A zone-wise flux expansion is used to formulate a direct collision probability problem within a cell. The coupling of the cells is made by making extra assumptions on the currents entering and leaving the interfaces. Two codes have been written: the first uses a cylindrical cell model and one or three terms for the flux expansion; the second uses a two-dimensional flux representation and does a truly two-dimensional calculation inside each cell. In both codes one or three terms can be used to make a space-independent expansion of the angular fluxes entering and leaving each side of the cell. The accuracies and computing times achieved with the different approximations are illustrated by numerical studies on two benchmark programs. (Atomindex citation 09:410169)

CEA-CONF-4000 PC **A02**/MF **A01**
CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France). Services d'Electronique.
T.S.C. in Hgl sub 2 Crystals Grown by Solution and Vapor Phase Techniques.
J. C. Muller, A. Friant, and P. Siffert. 25 May 77, 16p CONF-7706151-1
In French.Workshop on mercuric iodide and cadmium telluride nuclear detectors, Jerusalem, Israel, 6 Jun 1977.
U.S. Sales Only.

Thermally stimulated current measurements, performed between 77 exp 0 K and room temperature, are reported for mercuric iodide crystals, from different sources, and grown by different techniques: growth from solution of molecular complexes and growth from the vapour phase. Results can be divided in two main classes: the first one with a single important level, the second with many other levels. The origins of the two types of spectra is discussed. (Atomindex citation 09:392932)

CTH-RF-32 PC **A10**/MF **A01**
Chalmers Univ. of Technology, Goeteborg (Sweden). Institutionen foer Reaktorfysik.
Time Dependet Behaviour of the Neutron Field in in Two Interacting Cylindrical Disks.
These (Ph.D.),
T. Hedlund. 1979, 217p
U.S. Sales Only.

The influence of a void on the neutron flux in a moderating system has been studied mainly by the Monte Carlo method. The calculations simulate the decay of the neutron field in a pulsed neutron source measurement. The neutron flux was studied as a function of space, angle, energy and time for a system of two flat cylindrical polyethylene disks. The slab thickness was varied between 1.1 and 4.4 cm and the radius was 9.0 cm. The gap between the slabs was varied from zero to 18 cm. Some calculations have also been made for absorbers in the gap. The purpose of these absorbers was to eliminate the time delay effect for the low velocity neutrons accumulating in the gap. The calculations showed the usefulness of the absorber method. From the results in the time dependent cases the interaction parameter for the two slabs in the corresponding stationary cases has been calculated. The agreement with measurements made by Grosshoeg is good. In the one velocity cases some other methods have also been used to predict the decay rates. For small gap widths the best agreement with the Monte Carlo results was obtained with the variational method. (Atomindex citation 10:478575)

DOE/TIC-11075 PC **A02**/MF **A01**
EG and G Idaho, Inc., Idaho Falls.
Integral Cross-Section Measurements on Fission-Products in Fast Neutron Fields.
Y. D. Harker, and R. A. Anderl. 1979, 14p
Contract AC07-76ID01570

An integral measurement program is in progress at the Idaho National Engineering Laboratory (INEL).

The major emphasis in this program is on neutron capture cross-section measurements in the Coupled Fast Reactivity Measurement Facility (CFRMF) and in the Experimental Breeder Reactor II (EBR-II). The CFRMF measurements utilize activation techniques to arrive at integral capture cross-section data and similarly the EBR-II measurements utilize isotope dilution mass spectrometry. This paper reviews the status of the INEL measurement program and compare measured data with the ENDF/B derived integrals. Briefly, the results of those comparisons show that the ENDF/B IV data are the order of 25% greater than the CFRMF. (ERA citation 05:012789)

EFI-252(45)-77 PC **A02**/MF **A01**
Erevanskii Fizicheskii Inst. (USSR).
Radiation from Electrons of a Medium in the Passage of a Fast Particle Through the Medium.
A. L. Avakyan, and C. Yang. 1977, 20p
In Russian.
U.S. Sales Only.

The analysis of the frequency-angular spectra radiation, arising at the charged particle passage of the arbitrary number of plates in the pile, depending on the plate parameters and particle energy, is carried out. The cases, when the pile consists of one or several plates, are discussed. It is shown that in case of a thick plate or when the number of plates in the pile is rather large the radiation can be divided into transition and the Cherenkov radiation. Otherwise this separation is impossible. It is concluded that transition and the Cherenkov radiations result from the wave interference, arising at the interaction of medium electron with the flying charged particle. (Atomindex citation 10:478585)

EFI-265(58)-77 PC **A02**/MF **A01**
Erevanskii Fizicheskii Inst. (USSR).
Calculation of Bremsstrahlung Photon Beam Polarization.
R. O. Avakyan, N. Z. Akopov, A. P. Bezverkhaya, and S. M. Darbinyan. 1977, 8p
In Russian.
U.S. Sales Only.

The method of gamma quanta polarization calculation elaborated earlier is supplemented and improved. The intensity of emitted photons I(x) average over some experimental parameters is calculated. The Monte Carlo simulation scheme of energy spectra of coherent bremsstrahlung gamma quanta radiation has been changed in the part concerning the angular distribution of emitted gamma quanta. It is suggested that coherently produced gamma quanta are distributed according to the normal law but with an unknown dispersion sigmasub(coh.). The influence of the initial electron energy spread and the pair spectrometer resolution is taken into account. (Atomindex citation 10:478586)

FEI-786 PC **A02**/MF **A01**
Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Obninsk. Fiziko-Ehnergeticheskij Inst.
Fast Neutron Attenuation in Reactor Reflector Material.
V. S. Bykovskii, and N. A. Koloskov. 1977, 11p
In Russian.
U.S. Sales Only.

Radial distributions of fast neutrons in aluminium, stainless steel, beryllium and water reflectors have been experimentally investigated. The experiments are conducted using a critical assembly consisting of one or three sections of a sectional type research and test reactor. The measurements have been carried out with exp 237 Np fission chambers in cadmium sheath. Presented are basic parameters of the assemblies, experimental and calculated neutron relaxation lengths. The calculations are performed in terms of the Psub(i)-approximation using a one-dimensional 18-group code. The measurements have proved the additivity property of neutron fluences from several sources. The experimental lengths weakly depend on the core height and are in a good agreement with the calculated ones for the reflector materials. (Atomindex citation 10:438090)

HU-P-D-10 PC **A04**/MF **A01**
Helsinki Univ. (Finland). Dept. of Physics.
Direct Analysis of Nuclear Distributional Moments on the Basis of Neutron Diffraction Data.
Thesis (Ph.D.),
Aino Vahvaselkae. 1978, 63p
U.S. Sales Only.

Nuclear distributional moments of a Zn-atom in a crystal are calculated. The distribution is expressed as a multipole expansion in terms of site symmetrized spherical harmonics. The mean values are integrated from the radial coefficients of the corresponding multipole terms through Gaussian and difference series procedures by using recent thermal neutron diffraction structure factors as experimental data for zinc. The second moment $< x \exp 2 >$ agrees with the corresponding value of Merisalo and Larsen. On the basis of previous calculations and experimental results it indicates anharmonicity of nuclear thermal smearing, which is an aspect at whose study the distributional moments are applied. On the other hand $< z \exp 2 >$ show discrepancy with values based on the harmonic assumption. The magnitude of the third moment $< x \exp 3 >$ is the most inaccurate one of the values of the moments calculated, although the existence of the third order component in the nuclear smearing function is well established. (Atomindex citation 10:477946)

IFVE-ORI-78-153 PC **A02**/MF **A01**
Gosudarstvennyi Komitet po Ispol'zovaniyu Atomnoi Energii SSSR, Serpukhov. Inst. Fiziki Vysokikh Energii.
Simulating High Energy Particle Trajectories in a Medium with an Arbitrary Magnetic Field.
M. A. Maslov, N. V. Mokhov, and A. V. Uzunyan. 1978, 8p
In Russian.
U.S. Sales Only.

The algorithm of simulating the multiple Coulomb scattering of a charged particle in the limited media with arbitrary magnetic fields is described. The algorithm is a compound part of program complex for solution of the 3-dimensional problem of hadron and muon transfer in the energy range 10 exp -2 -10 exp 5 GeV. The described algorithm proved to be efficient for solution of the geometrically complicated problems for arbitrary magnetic fields. (Atomindex citation 10:477548)

JAERI-1253 PC **A03**/MF **A01**
Japan Atomic Energy Research Inst., Tokyo.
FEMRZ: Program for Solving Two-Dimensional Neutron Transport Problems in Cylindrical Geometry by the Finite Element Method.
T. Fujimura, T. Tsutsui, K. Horikami, Y. Nakahara, and T. Ohnishi. Feb 78, 29p
U.S. Sales Only.

A computer program based on the finite element method has been developed for solving multigroup neutron transport problems in two-dimensional cylindrical (r,z) geometry. In the solution algorithm, the method of higher order finite elements has been applied to the spatial variables on reactangular (r,z) subregions. It is based on the discontinuous method with Galerkin-type scheme. Some calculational examples are given for a guide to practical applications. The results and discussions are given in comparison with the S sub(n) method to illustrate the effectiveness of FEMRZ. It is seen that FEMRZ solutions obtained from the biquadratic approximation are accurate and stable enough even for the considerably coarse meshes. (Atomindex citation 09:412261)

JCU/NP-53 PC **A04**/MF **A01**
James Cook Univ. of North Queensland, Townsville (Australia). Dept. of Physics.
Elastic Scattering of Low Energy gamma - Rays. 1. Theoretical Background.
I. B. Whittingham. Jan 78, 63p
U.S. Sales Only.

The current status of the theory of the elastic scattering of low energy gamma rays is reviewed and a detailed analysis of the theoretical background to the recent calculation of Rayleigh scattering by W.R.Johnson and co-workers is presented. (Atomindex citation 10:474676)

LA-8112-MS PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
BIGAMON: A Program to Process the GAMMON Activation File.
R. J. LaBauve, and M. E. Battat. Nov 79, 17p
Contract W-7405-ENG-36

The BIGAMON program, designed to process the GAMMON activation file, is described. The program retrieves 100-group neutron reaction cross sections and 25-group gamma-ray decay spectra from the GAMMON file and bebins these data into broader multigroup sets. The photon broad group boundaries must be a subset of the Gammon group structure. 5 tables. (ERA citation 05:009476)

LA-8113-MS PC **A03**/MF **A01**
Los Alamos Scientific Lab., NM.
Calculation of Cell Volumes and Surface Areas in MCNP.
J. S. Hendricks. Jan 80, 30p
Contract W-7405-ENG-36

MCNP is a general Monte Carlo neutron-photon particle transport code which treats an arbitrary three-dimensional configuration of materials in geometric cells bounded by first- and second-degree surfaces, and some special fourth-degree surfaces. It is necessary to calculate cell volumes and surface areas so that cell masses, fluxes, and other important information can be determined. The volume/area calculation in MCNP computes cell volumes and surface areas for cells and surfaces rotationally symmetric about any arbitrary axis. 5 figures, 1 table. (ERA citation 05:014516)

LA-8176-MS PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
MCNP, A General Monte Carlo Code for Neutron and Photon Transport: A Summary.
W. L. Thompson. Dec 79, 15p
Contract W-7405-ENG-36

The general-purpose Monte Carlo code MCNP can be used for neutron, photon, or coupled neutron-photon transport, including the capability to calculate eigenvalues for critical systems. The code treats an arbitrary three-dimensional configuration of materials in geometric cells bounded by first- and second-degree surfaces and some special fourth-degree surfaces (elliptical tori). (ERA citation 05:012787)

LBL-10017 PC **A02**/MF **A01**
California Univ., Berkeley. Lawrence Berkeley Lab.
Evaluation of the Effects of Detonation in a Spherical Bomb.
J. Kurylo, and A. K. Oppenheim. Nov 79, 17p
CONF-790828-3
Contract W-7405-EBG-48
International colloquium on gas-dynamics of explosions and reactive systems, Gottingen, F.R. Germany, 20 Aug 1979.

An analysis is presented of the time-dependent pressure forces and impulse loadings on the walls of the hemispherical dome of a nuclear reactor pressure vessel arising from a centrally ignited hydrogen-oxygen detonation. Investigated in this context are the effects of richness of the detonable gas mixture as well as those due to the inclusion of water vapor. In the analysis the gas mixture was treated as a perfect gas, and the partial differential equations governing the gasdynamic flow were integrated using the CLOUD CODE - a finite-difference technique set in Lagrangian coordinates and incorporating the smoothing action of artificial viscosity. The most interesting results pertain to the ringing of pressure pulses at the walls. Their frequency is quite uniform, and their pressure peaks, at levels significantly higher than that of combustion at constant volume, decay at a negligible rate. (ERA citation 05:008551)

NUREG/CR-1374 PC **A09**/MF **A01**
Portland Cement Association, Skokie, IL. Construction Technology Labs.
Shear Transfer in Large Scale Reinforced Concrete Containment Elements.
Technical rept. no. 1,
R. G. Oesterle, and H. G. Russell. Apr 80, 189p

This report presents first results of an experimental program to investigate shear transfer in a cracked containment vessel without diagonal reinforcement. The test setup was designed and constructed to simulate boundary conditions of a wall ele-

ment of a pressurized containment subjected to tangential shear stresses. The experimental program included monotonic and reversing load tests on large scale specimens subjected to biaxial tension and shear. The specimens were 5-ft. square and 2-ft. thick with No. 14 and No. 18 reinforcement. Results of three monotonic tests are included in this report. The test variable was the level of biaxial tension. Observed behavior, strength and deformations are discussed.

PNL-SA-6520 PC **A02**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Risk of Transporting Spent Nuclear Fuel by Truck.
H. K. Elder, W. B. Andrews, and R. E. Rhoads. May 78, 10p CONF-780506-44
Contract EY-76-C-06-1830
Symposium on packaging and transportation of radioactive materials, Las Vegas, NV, USA, 7 May 1978, Portions of document are illegible.

The risk methodology used to evaluate the risk in shipping spent fuel includes: 1) a description of the spent fuel transport system, 2) identification of potential release sequences, 3) evaluation of the probabilities and consequences of the releases, and 4) calculation and assessment of the risk. The system description includes projected industry characteristics, amounts to be shipped, shipping package descriptions, material characteristics, transport mode, transport routes used and weather and population distribution information. Release sequences are identified by fault tree analysis techniques. Releases are evaluated using package failure data, normal transport and transport accident environment data and mathematical models for material dispersion and resultant health effects. This information is combined to calculate the shipping system risk which is compared to other known risks. The data may be further analyzed to determine the primary contributors to the risk and identify possible methods for reducing the risk, if the current risk level is judged by society to be unacceptable. (ERA citation 05:011322)

PNL-SA-6527 PC **A02**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Identification and Prioritization of Potential Problems in Nuclear Material Transportation, Now Through 2000.
J. G. DeSteese, and R. E. Rhoads. 1977, 7p
Contract EY-76-C-06-1830

Specific potential problems are identified which collectively contribute to the uncertainties about future conditions and events that may frustrate the development of adequate and timely transportation for nuclear fuel cycle materials. In particular, the impacts of these uncertainties may include continuous changes, critical delays and escalating costs in the development of spent fuel and waste transportation systems. The management of these uncertainties is the aggregate potential problem to be faced in the next decade, with possibly the future growth of the nuclear power industry at stake. We recommend that the development of nuclear material transportation systems be organized as coordinated industry/government missions with specific performance objectives. Mission planning and control functions should be organized to produce contingency plans for managing the impacts of future uncertainties on a whole-system basis. These plans should be based on the dynamic modeling and continously updated assessment of future concern scenarios. This systems approach could directly lessen the potential impact of many concerns discussed in this paper and provide, in advance, an inventory of options to maintain the required integrity and schedule of system development. There are many opportunities for innovation in system development and organization which may mitigate the effects of potential problems.Innovation in communications is also required to focus on public attitudes and provide better coordination of program efforts. While the current outlook for nuclear material transportation in the United States is beset with potentially serious problems, the above avenues of action are a basis for guarded optimism that the situation can be improved. (ERA citation 05:011323)

PNL-SA-6530 PC **A02**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Risks of Shipping Plutonium by Truck, Train, and Cargo Aircraft.
J. F. Johnson, and W. B. Andrews. May 78, 8p CONF-780506-46
Contract EY-76-C-06-1830
Symposium on packaging and transportation of radioactive materials, Las Vegas, NV, USA, 7 May 1978.

Risk is defined as the product of the probability of a release of material to the environment and the consequences resulting from the release. The methodology is composed of four basic steps: a detailed description of the transportation system, the identification of possible material release sequences, the evaluation of the probabilities and the consequences of the releases, and calculation and assessment of the risk. The system description includes projected industry characteristics, amounts to be shipped and the number of shipments required, material characteristics, transport mode and carrier, container types, routes (and any restrictions), and weather and population zones. Release sequences are identified using fault tree analyses. Releases are evaluated using container failure data and mathematical models for dispersion and health effects. The risk is then calculated and compared to other known risks. (ERA citation 05:011324)

PNL-SA-6603 PC **A02**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Measuring Neutron Dose and Quality Factors with Tissue Equivalent Proportional Counters.
L. W. Brackenbush, G. W. R. Endres, and L. G. Faust. 1978, 11p CONF-780612-10, IAEA-SM-229/52
Contract EY-76-C-06-1830
Symposium on advances in radiation protection monitoring, Stockholm, Sweden, 26 Jun 1978.

The methods used to obtain absolute neutron dose measurements and quality factor determination from the tissue equivalent proportional counter (TEPC) are reviewed. Exposure to nearly monoenergetic neutrons with energies from 200 keV to 7.5 MeV indicate that the absorbed dose due to fast neutrons measured by the TEPC averaged 3% higher, with a standard deviation (1 sigma) of 9%, than the tissue kerma calculated from neutron fluence measurements. The absorbed dose due to fast neutrons measured by the TEPC agreed within 0.6% of the calculated tissue kerma for a PuBe neutron source, whose neutron yield was determined within 2% by the United States National Bureau of Standards. Data are presented which show the TEPC measures quality factors accurately enough for health physics purposes for neutrons with energies between 200 keV and 5 MeV. (ERA citation 05:012790)

PNL-SA-7187 PC **A02**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Contaminated Concrete Surface Layer Removal.
J. M. Halter, and R. G. Sullivan. Sep 78, 21p CONF-780907-7
Contract EY-76-C-06-1830
Conference on contamination, Washington, DC, USA, 10 Sep 1978.

Equipment is being developed to economically remove contaminated concrete surfaces in nuclear facilities. To be effective this equipment should minimize personnel radiation exposure, minimize the volume of material removed, and perform the operation quickly with the least amount of energy. Several methods for removing concrete surfaces are evaluated for use in decontaminating such facilities. Two unique methods especially suited for decontamination are described: one, the water cannon, is a device that fires a high-velocity jet of fluid causing spallation of the concrete surface; the other, a concrete spaller, is a tool that exerts radial pressure agains the sides of a pre-dilled shallow cylindrical hole causing spallation to occur. Each method includes a means for containing airborne contamination. Results of tests show that these techniques can rapidly and economically remove surfaces, and leave minimal rubble for controlled disposal. (ERA citation 05:010440)

PNL-SA-7381 PC **A02**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Impact of LWR Decontamination on Radwaste Systems.
L. D. Perrigo, and J. R. Divine. 1979, 13p CONF-790313-5
Contract EY-76-C-06-1830
NACE/Corrosion 1979 meeting, Atlanta, GA, USA, 12 Mar 1979.

Increased radiation levels around certain reactors in the United States and accompanying increases in personnel exposures are causing a reexamination of options available to utilities to continue operation. One of the options is decontamination of the primary system to reduce radiation levels. The Battelle-Northwest study of decontamination and its impact on radwaste systems has been directed towards existing reactors and allied systems as they are employed during their operational lifetimes. Decommissioning and cleanup during such work are not within the scope of this project although certain processes and waste systems might be similar. Rupture debris cleanup represents a special situation that requires different design features and concepts and it is not a part of this study. (ERA citation 05:010048)

PNL-SA-7770 PC **A03**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Decontamination Methods.
L. D. Perrigo, and J. R. Divine. 23 May 79, 32p CONF-7905131-1
Contract EY-76-C-06-1830
American Society of Mechanical Engineers radioactive waste management course, Alexandria, VA, USA, 21 May 1979.

This paper discusses decontamination methods for LWRs. Emphasis is on the chemical cleaning of primary systems and contaminated equipment and components. The equipment is composed primarily of stainless steel, Inconel, Zircaloy, and a few other materials. Variables affecting efficiency are discussed. 10 figures. (ERA citation 05:012266)

SLAC-PUB-2422 PC **A03**/MF **A01**
Stanford Linear Accelerator Center, CA.
Radiation Spectra and Angular Distribution of Emitted Quanta for Planar Channelled Particles: Dependence on Particle Energy.
S. Kheifets, and T. Knight. Oct 79, 30p PEP-NOTE-323, CONF-791226-1
Contract EY-76-C-03-0515
APS electron and atomic physics meeting, Houston, TX, USA, 10 Dec 1979.

Using a method of calculating the radiation characteristics for the motion in an arbitrary one-dimensional potential, developed in the previous paper, we look here for the maximum in the number of emitted photons as a function of particle energy for different amplitudes of oscillations, divergence angles in a plane parallel to the trapping crystal planes and harmonic numbers. The problem is treated in the classical approximation. A numerical example is given for positron channelling in the (1,1,0) direction of a Silicon crystal. The influence of the refraction index is discussed briefly. (ERA citation 05:012788)

UCRL-Trans-11490 PC **A03**/MF **A01**
Influence of Temperature on the Production and Recombination of Carriers in alpha-Ray Columns.
W. Seitter. 1939, 31p
Contract W-7405-ENG-48
A , Ann. Phys. (Leipzig), 34 n2 P113-129 1939.

The influence of pressure and temperature on alpha-ray conductivity in air, krypton, and neon was studied by plotting current-pressure curves for various voltages and for a temperature difference of approximately 200 exp 0 C. The temperature coefficient, beta = 1/i di/dT, and relative values of the recombination coefficient, alpha , were derived as a function of pressure, temperature, and voltage from the observed curves. The temperature coefficient, beta , decreases with increasing gas pressure and for krypton and neon approaches zero. The graphically determined saturation currents of the current-voltage curves increase with gas temperature, particularly at the lower densities. This indicates that molecular energy also participates in carrier formation. The attempt to describe the present observations by existing theoretical formulas led to the conclusion that these

formulas are inadequate exhaustively to account for the actual processes in the experiments. The recombination coefficient, alpha , increases slowly with increasing pressure at room temperature for air and approaches a maximum. Within the pressure range studied it decreases with increasing temperature. The influence of temperature on alpha seems to become less pronounced with increasing density. 13 figures. (ERA citation 05:010921)

18G. Radioactive Wastes and Fission Products

AECL-6188-1 PC **A09**/MF **A01**
Acres Consulting Services Ltd., Toronto (Ontario).
Radioactive Waste Repository Study. Part 1.
Nov 78, 189p
U.S. Sales Only.

This is the first part of a report of a preliminary study for Atomic Energy of Canada Limited. It considers the requirements for an underground waste repository for the disposal of wastes produced by the Canadian Nuclear Fuel Program. The following topics are discussed with reference to the repository: 1) underground layout, 2) cost estimates, 3) waste handling, 4) retrievability, decommissioning, sealing and monitoring, and 5) research and design engineering requirements. (Atomindex citation 10:461930)

AECL-6188-2 PC **A09**/MF **A01**
Acres Consulting Services Ltd., Toronto (Ontario).
Radioactive Waste Repository Study. Part 2.
Nov 78, 198p
U.S. Sales Only.

This is the second part of a report of a preliminary study for AECL. It considers the requirements for an underground waste repository for the disposal of wastes produced by the Canadian Nuclear Fuel Program. The following topics are discussed with reference to the repository: 1) geotechnical assessment, 2) hydrogeology and waste containment, 3) thermal loading and 4) rock mechanics. (Atomindex citation 10:461931)

AECL-6188-3 PC **A02**/MF **A01**
Acres Consulting Services Ltd., Toronto (Ontario).
Radioactive Waste Repository Study. Part 3 (Summary).
Nov 78, 20p
U.S. Sales Only.

This is the third part of a report of a preliminary study for AECL. It summarizes the topics considered in reports AECL-6188-1 and AECL-6188-2 as requirements for an undergpound repository for disposal of wastes produced by the Canadian Nuclear Fuel Program. (Atomindex citation 10:461932)

AECL-6356 PC **A02**/MF **A01**
Atomic Energy of Canada Ltd., Chalk River (Ontario). Chalk River Nuclear Labs.
Proposal to Study the Stability of Zircaloy-Clad UO sub 2 Fuel Elements During Long-Term Storage.
A. S. Bain, D. G. Hardy, and M. Tayal. Sep 78, 13p
U.S. Sales Only.

Irradiated CANDU fuel bundles have been successfully stored under water for up to 16 years. Laboratory corrosion data give confidence that such storage for much longer times will pose no problem. This report outlines a proposed experimental program to study the stability of irradiated Zircaloy-clad UO sub 2 fuel elements during long-term storage in water. We intend to perform, at five-year intervals during the next twenty to thirty years, non-destructuve (e.g. neutron radiography) and destructive (e.g. metallographic examination) tests on irradiated fuel elements currently stored in the bays of the NRX and NRU reactors, in dry storage in Building 375 at Chalk River Nuclear Laboratories and in the storage bays at Pickering Nuclear Generating Station in order to monitor the continued ability of the clad to contain radioactive fission products. These tests are designed to study the effects of the severity of a fuel element's internal environment (controlled primarily by element power and burnup) and the rate of the element's external corrosion (both aqueous and galvanic) on clad stability. The results obtained from such periodic checks on the Zircaloy sheaths are expected to confirm that discharged CANDU fuel can be safely stored in an interim storage facility for at least 50 years before it is transferred to an underground repository, or to a reprocessing plant. (Atomindex citation 10:461938)

AED-Conf-77-473-002 PC **A02**/MF **A01**
Zentralstelle fuer Atomkernenergie-Dokumentation, Eggenstein-Leopoldshafen (Germany, F.R.).
Iodine Release in Reprocessing Plants.
J. G. Wilhelm, and J. Furrer. 1977, 17p CONF-771139-17
In German.Radioactive effluents from nuclear fuel reprocessing plants seminar, Karlsruhe, F.R. Germany, 22 Nov 1977.
U.S. Sales Only.

In this review paper the requirements are mentioned which have to be made under health physics aspects to off gas purification of reprocessing plants as a result of radioiodine released from spent fuel. The different processes of radioiodine removal and the status of technical development are described, their advantages and disadvantages are discussed, details are given on iodine removal from the gas phase by means of wet washing and on the removal by solid sorption materials. Also a method is mentioned allowing to separate iodine from the feed solution by precipitation. Problems are indicated which have to be solved by current and future R and D activities such as iodine removal from the vessel off gas and the stability for storage of the products resulting from removal processes. (Atomindex citation 09:388788)

AED-Conf-77-473-003 PC **A02**/MF **A01**
Zentralstelle fuer Atomkernenergie-Dokumentation, Eggenstein-Leopoldshafen (Germany, F.R.).
Liquid and Airborne Effluents from the Windscale Nuclear Fuel Reprocessing Plant.
M. J. Larkin. 1977, 10p CONF-771139-17
Radioactive effluents from nuclear fuel reprocessing plants seminar, Karlsruhe, F.R. Germany, 22 Nov 1977.
U.S. Sales Only.

The levels of the liquid and airborne effluent discharges are compared with the authorised discharge limits. Consideration is also given to actions already undertaken to minimize the effluent discharges and to the design of future treatment plants to achieve the policy objective of the Company that radioactive discharges will be such that radiation exposure of the public due to waste discharge will be less than 10% of the relevant recommendations of the ICRP on the control of public exposure to ionising radiations. The paper reviews what is currently being achieved in this effluent management field. It compares the radioisotopic discharges with the limits specified in the Certificate of Authorisation issued by the controlling central government departments - and considers broadly the means whereby further reductions can be made in the effluent discharge. (Atomindex citation 09:388779)

AED-Conf-77-473-029 PC **A02**/MF **A01**
Zentralstelle fuer Atomkernenergie-Dokumentation, Eggenstein-Leopoldshafen (Germany, F.R.).
Treatment of Gaseous Wastes in Vitrification Plants for Fission Products.
R. Bonniaud, A. Jouan, F. Laude, and C. Sombret. 1977, 22p CONF-771139-20
In French.Radioactive effluents from nuclear fuel reprocessing plants seminar, Karlsruhe, F.R. Germany, 22 Nov 1977.
U.S. Sales Only.

In order to solidify highly active fission product solutions from reprocessing of nuclear fuels, a discontinuous as well as continuous vitrification process has been developed and the appropriate plants been put into operation in Marcoule, France. The waste gases formed in the part processes of vitrification, evaporation, calcination and melting, are described according to their origin, chemical composition and their technical, chemical, radioactive or toxic effects and the effectivity of the equipment used in both methods to purify the waste gas are demonstrated. The behaviour and treatment of the volatile ruthenium, fluorine and mercury, as well as volatile components in the molten glass which are released when filling into storage containers (Cs 137, Ce 144, Ru 106) are particularly dealt with. In a bad case, decontamination factors of 10 exp 10 are reached. (Atomindex citation 09:389918)

AGNS-35900-1.2-45 PC **A05**/MF **A01**
Allied-General Nuclear Services, Barnwell, SC.
Studies and Research Concerning BNFP: Spent Fuel Disassembly and Canning Programs at the Barnwell Nuclear Fuel Plant (BNFP).
G. A. Townes, M. L. Rogell, and R. T. Anderson. Oct 79, 82p
Contract ET-78-C-09-1040

Methods of disassembling and canning spent fuel to allow more efficient storage are being investigated at the BNFP. Studies and development programs are aimed at dry disassembly of fuel to allow storage and shipment of fuel pins rather than complete fuel assemblies. Results indicate that doubling existing storage capacity or tripling the carrying capacity of existing transportation equipment is achievable. Disassembly could be performed in the BNFP hot cells at rates of about 12 to 15 assemblies per day. (ERA citation 05:013135)

AGNS-35900-1.4-59 PC **A04**/MF **A01**
Allied-General Nuclear Services, Barnwell, SC.
Studies and Research Concerning BNFP. Nuclear Spent Fuel Transportation Studies.
R. T. Anderson, and J. B. Maier. Nov 79, 63p
Contract ET-78-C-09-1040

Currently, there are a number of institutional problems associated with the shipment of spent fuel assemblies from commercial nuclear power plants: new and conflicting regulations, embargoing of certain routes, imposition of transport safeguards, physical security in-transit, and a lack of definition of when and where the fuel will be moved. This report presents a summary of these types and kinds of problems. It represents the results of evaluations performed relative to fuel receipt at the Barnwell Nuclear Fuel Plant. Case studies were made which address existing reactor sites with near-term spent fuel transportation needs. Shipment by either highway, rail, water, or intermodal water-rail was considered. The report identifies the impact of new regulations and uncertainty caused by indeterminate regulatory policy and lack of action on spent fuel acceptance and storage. This stagnant situation has made it impossible for industry to determine realistic transportation scenarios for business planning and financial risk analysis. A current lack of private investment in nuclear transportation equipment is expected to further prolong the problems associated with nuclear spent fuel and waste disposition. These problems are expected to intensify in the 1980's and in certain cases will make continuing reactor plant operation difficult or impossible. (ERA citation 05:013137)

AGNS-47921-TPR-1 PC **A02**/MF **A01**
Allied-General Nuclear Services, Barnwell, SC.
Studies and Research Concerning BNFP. Technical Progress Report, October 1979-December 1979.
25 Jan 80, 13p
Contract ET-78-C-09-1040

Work on the AFR spent fuel storage program is focused on developing design and licensing information for the model facility. To date, the design effort is proceeding on schedule. A subcontract for soils and structural design of the fuel transfers canal is ready for DOE review. Proposals for high-density rack design to bring the model facility up to a nominal 1750 MTU capacity have been received and are being reviewed internally. This subcontract should be available for DOE review in early February. A security subcontract has been awarded to International Energy Associates Limited and the preliminary design effort is underway. Licensing activities are progressing satisfactorily. Review of the governing local, state, and federal regulations has been completed. Format and schedule for the safety analysis report and the environmental report have been established. (ERA citation 05:011320)

ANL/ES-79 PC **A06**/MF **A01**
Argonne National Lab., IL.

Environmental Analysis of a Formerly Utilized MED/AEC Site: Site A and Plot M, Palos Forest Preserve, Palos Park, Illinois.
Sep 79, 107p
Contract W-31-109-ENG-38

This environmental analysis report describes the existing site environment and evaluates the environmental impacts of 8 options for remedial action, including allowing buried waste to remain undisturbed. Conformity or conflict with governmental statutes, regulations and standards was determined, especially with regard to compliance with contamination criteria and guidelines. The program of measurements, documentation, and control to demonstrate compliance with these criteria and guidelines was identified. (ERA citation 05:011364)

ANL/ES-80 PC **A05**/MF **A01**
Argonne National Lab., IL.
Engineering Evaluation of a Formerly Utilized MED/AEC Site. Site A and Plot M, Palos Forest Preserve, Palos Park, Illinois.
Sep 79, 76p
Contract W-31-109-ENG-38

This engineering evaluation report (EER) addresses one of these MED/AEC sites known as Site A/Plot M, located in Palos Park, Illinois. The EER describes in technical detail a number of options for remedial action that could be taken with respect to the contamination at Site A/Plot M and presents estimates of the costs associated with these options. A companion document, Environmental Analysis Report on a Formerly Utilized MED/AEC Site, Site A and Plot M, Palos Forest Preserve, Palos Park, Illinois (ANL/ES-79), has also been prepared. It describes in detail the existing site environment and evaluates the environmental impacts of the various remedial options discussed in this report. This EER contributes to a better understanding of the mitigation or resolution of environmental problems posed by the subject MED/AEC site and serves as a basis for determining whether or not remedial actions are warranted. The knowledge derived from the evaluation of a number of remedial options should be helpful in the final disposition of other MED/AEC sites located elsewhere. (ERA citation 05:009702)

ANL-Trans-1181 PC **A02**/MF **A01**
Handling High-Level Radioactive Wastes.
W. Heimerl. 1978, 21p
Contract W-31-109-ENG-38
A , Chem. Unserer Zeit, 12 n3 P82-88 1978.

High-activity waste (HAW) solutions which result from the reprocessing of irradiated reactor fuels is a problem because of the long-lived radioactivity. Tank storage is only an intermediate solution. Solidification of HAW solutions is a better solution, particularly vitrification. The German PAMELA process is described in detail; it involves producing the glass in the form of beads in a heavy metal matrix. Plans to store the solidified HAW in salt domes are discussed. From the technical standpoint, a large facility can be built by the 1990's for disposing of the waste from an industrial reprocessing plant. 9 figures, 2 tables. (ERA citation 05:011363)

BAW-1484-7 PC **A06**/MF **A01**
Babcock and Wilcox Co., Lynchburg, VA.
Critical Experiments Supporting Close Proximity Water Storage of Power Reactor Fuel. Technical Progress Report.
M. N. Baldwin, G. S. Hoovler, R. L. Eng, and F. G. Welfare. Jul 79, 103p
Contract EY-77-C-09-1001

Close-packed storage of LWR fuel assemblies is needed in order to expand the capacity of existing underwater storage pools. This increased capacity is required to accommodate the large volume of spent fuel produced by prolonged onsite storage. To provide benchmark criticality data in support of this effort, 20 critical assemblies were constructed that simulated a variety of close-packed LWR fuel storage configurations. Criticality calculations using the Monte Carlo KENO-IV code were performed to provide an analytical basis for comparison with the experimental data. Each critical configuration is documented in sufficient detail to permit the use of these data in validating calculational methods according to ANSI Standard N16.9-1975. (ERA citation 05:013138)

BNL-26455 PC **A02**/MF **A01**
Brookhaven National Lab., Upton, NY.
Strain Related Radiation Damage Measurements in Rock Salt for Waste Disposal Applications. Quarterly Report, April 1, 1979-June 30, 1979.
K. J. Swyler, L. J. Teutonico, and P. W. Levy. 10 Jul 79, 23p ONWI/Sub-78/E511-01000-8
Contract EY-76-C-02-0016

Radiation damage in natural rock salt, synthetic NaCl crystals, and other minerals of interest for radioactive waste disposal application was studied. The following topics were covered: (1) temperature dependence of radiation induced F-center formation in rock salt from drill hole AEC-8, (2) temperature dependence of the radiation induced colloid formation in AEC-8 rock salt, (3) thermally induced colloid formation, (4) radiation induced colloid and color-center formation in different regions of non-uniformly colored crystals, (5) comment on differences in colloid formation between natural and synthetic rock salt, and (6) theoretical studies on dislocations in rock salt. (ERA citation 05:011343)

BNL-26931 PC **A03**/MF **A01**
Brookhaven National Lab., Upton, NY.
Strain Related Radiation Damage Measurements in Rock Salt for Waste Disposal Applications. Quarterly Report, July 1-September 30, 1979.
K. J. Swyler, L. J. Teutonico, and P. W. Levy. 10 Oct 79, 26p ONWI/Sub-78/E511-01000-11
Contract EY-76-C-02-0016

Radiation damage in natural rock salt, synthetic NaCl crystals, and other minerals of interest for radioactive waste disposal application was studied. The following topics were covered: (1) the role of strain applied prior to irradiation on the radiation-induced defect formation in natural rock salt from Drill Hole AEC-8, (2) studies to determine why synthetic and natural rock salt exhibit different radiation damage characteristics, (3) new yield point measurements on Alt Aussee natural rock salt, and (4) theoretical studies on the role of dislocations in the nucleation of colloidal sodium particles in the irradiated rock salt. (ERA citation 05:011344)

CONF-791112-45 PC **A02**/MF **A01**
Detroit Univ., MI.
General Criteria for Radioactive Waste Disposal.
M. N. Maxey, B. C. Musgrave, and G. B. Watkins. 1979, 6p
Contract EY-76-C-07-1570
Symposium on the scientific basis for nuclear waste management, Boston, MA, USA, 26 Nov 1979.

Techniques are being developed for conversion of radioactive wastes to solids and their placement into repositories. Criteria for such disposal are needed to assure protection of the biosphere. The ALARA (as low as reasonably achievable) principle should be applicable at all times during the disposal period. Radioactive wastes can be categorized into three classes, depending on the activity. Three approaches were developed for judging the adequacy of disposal concepts: acceptable risk, ore body comparison, and three-stage ore body comparison. (ERA citation 05:008154)

DOE/EV-0005/17 PC **A05**/MF **A01**
Oak Ridge National Lab., TN.
Formerly Utilized MED/AEC Sites Remedial Action Program: Radiological Survey of the Former Simonds Saw and Steel Co., Lockport, New York. Final Report.
Nov 79, 86p
Contract W-7405-ENG-26

Results of a radiological survey of the former Simonds Saw and Steel Company (current name of this facility is Guterl Special Steel Corporation), Lockport, New York, are presented in this report. During the period 1948 to 1956, this company handled large quantities of uranium metal and smaller quantities of thorium metal in rolling mill operations. The survey included measurement of residual alpha and beta-gamma radiation levels in the rolling mill building and forging shop; external gamma radiation in the same area; uranium, radium, and thorium in soil samples taken from beneath removable floor plates in the rolling mill area and from other parts of the site; radon and radon daughter concentrations in the rolling mill building and contamination in drainage paths leading from the buildings and grounds. Elevated concentrations of uranium were found in soil samples taken from beneath the floor plates within 40 ft of the 16-inch rolling mill. Beta-gamma radiation levels were greater than 1 mrad/hr at the locations having the highest concentrations of uranium. External gamma radiation levels were above the background level in a few small isolated areas in the rolling mill building. The 16-inch rolling mill showed elevated alpha and beta contamination levels in several areas. (ERA citation 05:011365)

DP-MS-79-20 PC **A03**/MF **A01**
Du Pont de Nemours (E.I.) and Co., Aiken, SC. Savannah River Lab.
Migration of Transuranic Nuclides in Earthen Burial Trenches at the Savannah River Plant.
D. R. Johnson, and E. L. Wilhite. 1979, 37p
Contract EY-76-C-09-0001

The objectives, incentives and benefits derived from the data collected at the Savannah River Laboratory on waste migration were discussed, and encapsulated transmission waste burial data were presented. Factors influencing radionuclide migration were characterized. A map of the burial ground was included. The trench sampling strategy was summarized. A description of the coring samples was included. Actual soil recovery results were tabulated, and a specific problem which reduced recoveries even when using a Shelby tube core was discussed. Data on waste strike distribution and activity as a function of depth were 'abulated. The composition of recovered waste was tabulated. Wood and paper were well preserved in spite of long burial. Radiation of core samples was measured. The distribution of plutonium among soil particle sizes was determined. (ERA citation 05:011345)

DP-MS-79-30 PC **A02**/MF **A01**
Du Pont de Nemours (E.I.) and Co., Aiken, SC. Savannah River Lab.
Canister Compatibility with Carlsbad Salt.
W. N. Rankin. 1979, 11p CONF-800305-1, CONF-791112-46
Contract EY-76-C-09-0001
Corrosion/80 NACE meeting, Chicago, IL, USA, 6 Mar 1980.

No significant reaction was found when candidate canister alloys were heated with salt from Carlsbad, New Mexico, for up to 5000 hours in sealed capsules and for up to 10,000 hours in unsealed capsules at temperatures (80 to 225 exp 0 C) that bracket the maximum temperature calculated for reference Savannah River Plant (SRP) waste containers at 20-foot spacings in salt. Additional tests were made at 600 exp 0 C in sealed capsules to characterize reactions that may occur between candidate canister alloys and any component of the salt that is released when decrepitation occurs. Under these extreme conditions there was no significant attack of Type 304L stainless steel. But, there was up to 20-mils attack of the low-carbon steel. (ERA citation 05:009713)

DP-MS-79-39 PC **A03**/MF **A01**
Du Pont de Nemours (E.I.) and Co., Aiken, SC. Savannah River Lab.
Attack of High-Strength, Oxidation-Resistant Alloys During in-Can Melting of Simulated Waste Glasses.
W. N. Rankin. 1980, 31p CONF-800305-3
Contract EY-76-C-09-0001
Corrosion/80 NACE meeting, Chicago, IL, USA, 6 Mar 1980.

The restistance of candidate canister alloys to penetration under the most severe conditions expected during in-can melting was directly proportional to the chromium content of the alloy, and inversely proportional to the Na sub 2 O content of the glass melt. Specimens were exposed for 24 hours, which is the time required for in-can melting full-size waste-glass forms based on tests carried out at Pacific Northwest Laboratories (PNL) and at SRL. The penetration resistance to Frit 211 at 1150 exp 0 C for 24 hours of most alloys tested was satisfactory. The amount of penetration would

not affect the integrity of the waste form. Inconel 625, Hastelloy X, and Inconel 601 were penetrated < 20 mils. This was considered excellent. Incoloy 801, Type 310 stainless steel, Type 304L stainless steel, Inconel 600, and Type 347 stainless steel were penetrated < 40 mils. This was considered good. Hastelloy C-4 was penetrated > 100 mils by a glass composed of 65 wt % Frit 21 and 35 wt % composite sludge (with uranium) at 1150 exp 0 C for only 7 hours. This amount of penetration of an in-can melting canister would not be satisfactory. 12 figures. (ERA citation 05:011333)

DP-MS-79-55 PC **A02**/MF **A01**
Du Pont de Nemours (E.I.) and Co., Aiken, SC. Savannah River Lab.
Calculation of Radionuclides in the Defense Waste Processing Facility.
J. R. Chandler, D. R. Finch, and G. W. Becker, Jr. 1979, 15p CONF-791103-51
Contract EY-76-C-09-0001
American Nuclear Society meeting, San Francisco, CA, USA, 12 Nov 1979.

SHIELD system calculations yield the isotopic inventory, activity, decay heat, and multigroup radiation source spectra for all of the DWPF process streams and for the solidified waste products. One application of these results is the analysis of the radiation emissions of the stored waste. Another application is the analysis of time dependent properties of the solidified waste. Initially, gamma radiation from /sup 137m/Ba decay contributes approximately one-third of the total energy. As the exp 137 Cs content decreases, the gamma contribution declines. The major producers of beta radiation are the exp 90 Sr, exp 137 Cs, and exp 144 Pr decay chains. As the glass age increases, however, the contribution from the actinides dominates increasingly. The inital activity level in the glass is 2000 curies per gallon. The activity and decay heat decrease by a factor of 2 in about fifteen years, and by a factor of 4 in fifty years. A similar analysis was made for the salt cake. Initially, the salt cake produces 0.01 watts per gallon from 2.4 curies per gallon of activity. In five years, the activity is reduced by a factor of 19, and the decay heat declines by a factor of 24. After ten years, both the activity and decay heat levels are less than 1% of their initial values. 7 figures, 4 tables. (ERA citation 05:009703)

DP-1545 PC **A05**/MF **A01**
Du Pont de Nemours (E.I.) and Co., Aiken, SC. Savannah River Lab.
Preliminary Evaluation of Alternative Forms for Immobilization of Savannah River Plant High-Level Waste.
J. A. Stone, S. T. Goforth, Jr., and P. K. Smith. Dec 79, 98p
Contract EY-76-C-09-0001

An evaluation of available information on eleven alternative solid forms for immobilization of SRP high-level waste has been completed. Based on the assessment of both product and process characteristics, four forms were selected for more detailed evaluation: (1) borosilicate glass made in the reference process, (2) a high-silica glass made from a porous glass matrix, (3) crystalline ceramics such as supercalcine or SYNROC, and (4) ceramics coated with an impervious barrier. The assessment includes a discussion of product and process characteristics for each of the eleven forms, a cross comparison of these characteristics for the forms, and the bases for selecting the most promising forms for further study. (ERA citation 05:009706)

DP-78-125-4 PC **A08**/MF **A01**
Du Pont de Nemours (E.I.) and Co., Aiken, SC. Savannah River Lab.
Waste Management Program Technical Progress Report, October-December 1978.
Jan 80, 156p
Contract EY-76-C-09-0001

This quarterly report provides current information on operations and development programs for the management of radioactive wastes from the operation of the Savannah River Plant. The operational status and research progress are reported for the liquid waste treatment and storage facilities, the incinerator for solid waste, the solidification of waste in borosilicate glass, and siting of subsurface storage facilities. (ERA citation 05:011325)

DP-79-125-1 PC **A05**/MF **A01**
Du Pont de Nemours (E.I.) and Co., Aiken, SC. Savannah River Lab.
Waste Management Program Technical Progress Report, January-March 1979.
Jan 80, 79p
Contract EY-76-C-09-0001

This quarterly report provides current informaton on operations and development programs for the management of radioactive wastes from the operation of the Savannah River Plant. The operational status and research progress are reported for the liquid waste treatment and storage facilities, the incinerator for solid waste, the solidification of waste in borosilicate glass, and siting of subsurface storage facilities. (ERA citation 05:011326)

DPST-79-294 PC **A04**/MF **A01**
Du Pont de Nemours (E.I.) and Co., Aiken, SC. Savannah River Lab.
Glass as a Matrix for SRP High-Level Defense Waste.
J. R. Wiley, N. E. Bibler, M. D. Dukes, and M. J. Plodinec. Jan 80, 53p
Contract EY-76-C-09-0001

Work done at Savannah River Laboratory and elsewhere that has led to development of glass as a candidate for solidifying Savannah River Plant waste is summarized. Areas of development described are glass formulation and fabrication, and leaching and radiation effects. (ERA citation 05:013151)

EMSL-LV-0539-31 PC **A07**/MF **A01**
Environmental Monitoring Systems Lab., Las Vegas, NV.
Off-Site Environmental Monitoring Report for the Nevada Test Site and Other Test Areas Used for Underground Test Areas Used for Underground Nuclear Detonations, January-December 1978.
R. F. Grossman. Oct 79, 147p
Contract EY-76-A-08-0539

Under Memorandum of Understanding No. EY-76-A-08-0539 with the US Department of Energy (DOE), the US Environmental Protection Agency (EPA), Environmental Monitoring and Support Laboratory-Las Vegas (EMSL-LV), continued its Off-Site Radiological Safety Program within the environment surrounding the Nevada Test Site (NTS) and at other sites designated by the DOE during calendar year 1978. This report, prepared in accordance with the DOE Manual, Chapter 0513, contains summaries of the EMSL-LV dosimetry and sampling methods and analytical procedures, and the analytical results from environmental samples collected in support of the DOE nuclear testing activities. Where applicable, dosimetry and sampling data are compared to appropriate guides for external and internal exposures of humans to ionizing radiation. In addition, a brief summary of pertinent, and demographical, features of the NTS and the NTS environs is presented for background information. (ERA citation 05:014200)

HEDL-TME-78-58 PC **A04**/MF **A01**
Hanford Engineering Development Lab., Richland, WA.
Spent Fuel Integrity During Transportation.
C. W. Funk, and L. D. Jacobson. Jan 80, 54p
Contract EY-76-C-14-2170

The conditions of recent shipments of light water reactor spent fuel were surveyed. The radioactivity level of cask coolant was examined in an attempt to find the effects of transportation on LWR fuel assemblies. Discussion included potential cladding integrity loss mechanisms, canning requirements, changes of radioactivity levels, and comparison of transportation in wet or dry media. Although integrity loss or degradation has not been identified, radioactivity levels usually increase during transportation, especially for leaking assemblies. (ERA citation 05:013140)

HEDL-TME-79-15 PC **A05**/MF **A01**
Hanford Engineering Development Lab., Richland, WA.
Division of Waste Management Programs. Progress Report, July-December 1978.
R. E. Lerch, C. R. Allen, and G. L. Richardson. Jul 79, 86p
Contract EY-76-C-14-2170

This is the eleventh progress report on Division of Waste Management programs. The report describes progress in the second half of 1978 on the following programs: intermediate-level waste solidification, chemical processing of combustible solid waste, and application of acid digestion to commercial wastes. The latter two programs were combined in October 1978 into a single program, acid digestion of combustible wastes. (ERA citation 05:011327)

INIS-mf-4472 PC **A02**/MF **A01**
Empresa Nacional del Uranio, Madrid (Spain).
Prospects of Spent Management in Spain.
C. Melches, E. Ramirez, F. Selgas, P. A. Cabanilles, and B. Lopez Perez. 1978, 10p CONF-780658-17
Seminar on the storage of spent fuel elements, Madrid, Spain, Jun 1978.
U.S. Sales Only.

The purpose of this paper is to outline the forecast on spent fuel management in Spain, taking into account the international developments produced during the last years and specially on LWR fuels. This forecast is based on the following actions: increase of the storage capacity in the reactors: construction of an independent spent fuel storage installation (ISFSI) and a fuel reprocessing pilot plant. (Atomindex citation 10:421653)

INIS-mf-4473 PC **A02**/MF **A01**
Instituto Peruano de Energia Nuclear, Lima.
Neutron Analysis of Spent Fuel Pools.
J. Pereyra, R. Caro, J. M. Cano, E. Donoso, and A. Esteban. 1978, 6p CONF-780658-19
Seminar on the storage of spent fuel elements, Madrid, Spain, Jun 1978.
U.S. Sales Only.

The nuclear energy industry in Spain, as everywhere in the world, is facing the problem of increasing the capacity of the existing pools for storing spent fuel elements. At JEN the problems related with this circumstance are being analyzed. In this work part of the corresponding research is included and it is expected to publish in the very near future a more detailed comprehensive work including neutronics, thermohydraulic and shielding aspects of the spent fuel pool design. (Atomindex citation 10:421655)

INIS-mf-4474 PC **A02**/MF **A01**
SENER, Tecnica Industrial y Naval, Bilbao (Spain).
Expansion of Capacity of Spent Fuel Pools and Associated Problems.
J. L. De Francisco, J. Lopez-Cotarelo, and J. M. Ramos. 1978, 13p CONF-780658-16
Seminar on the storage of spent fuel elements, Madrid, Spain, Jun 1978.
U.S. Sales Only.

Expanding the spent fuel storage pool capacity is a good solution for utilities facing the current shortage in fuel reprocessing capacity. The problems more likely to be found when expanding a spent fuel storage facility by using high density storage racks are reviewed. Basically three types of problems arise: 1) Problems related with the characteristics of the new facility. 2) Problems related with the works of expansion. 3) Problems related with the long term storage of large quantities of spent fuel. (Atomindex citation 10:421651)

INIS-mf-4475 PC **A02**/MF **A01**
Hidroelectrica Espanola, Madrid.
Cost and Implications of a Middle-Term Program for Storage of Spent Fuel in a Nuclear Power Station (BWR).
J. L. Mochon, and R. Quintana. 1978, 7p CONF-780658-18
Seminar on the storage of spent fuel elements, Madrid, Spain, Jun 1978.
U.S. Sales Only.

The experience gained with the Cofrentes Nuclear Power Station Project is presented. Originally the station had two spent fuel storage pools, in the fuel building, plus a little pool inside the containment, and all were to be fitted with extensive aluminium storage racks with a total capacity for 1+-1/3 cores. Due to the present world situation with regard to the "back-end"of the fuel cycle, it was

decided to enlarge the pools size and to change the design of the racks, to obtain a final storage capacity of 5+-1/4 cores, so covering over 18 years of operation. The changes introduced in the project, as well as its costs, and the possibilities of election still open are examined in the paper. (Atomindex citation 10:421654)

INIS-mf-4483 PC **A02**/MF **A01**
Ente Nazionale per l'Energia Elettrica, Rome (Italy).
Evaluation of the Problems Associated with ENEL'S Irradiated Fuel Management.
L. Sani, and U. Belelli. 1978, 8p CONF-780658-20
Seminar on the storage of spent fuel elements, Madrid, Spain, Jun 1978.
U.S. Sales Only.

The present difficulties in the reprocessing field, wich will continue for a period of time not easily definable, impose on the nuclear utilities the research of adequate solutions to solve the problem associated with storage of the fuels discharged by the nuclear power stations in operation. In this context, the paper examines the technical aspects of the various possible alternatives and on the basis of the Italian nuclear program, possible storage strategies are discussed on the assumption of the development of an adequate oxide-fuel reprocessing capacity. The problems related to storage in pools at the station or away from reactor are described in the light of the recent experience made in Italy with the adaptation of an old pool reactor out of service, that is, the Avogadro reactor in Saluggia, to store the fuels of the stations now in operation. Finally some economic aspects are considered in order to ascertain their impact on the cost of energy produced. (Atomindex citation 10:421656)

INIS-mf-4594 PC **A02**/MF **A01**
Zentralstelle fuer Atomkernenergie-Dokumentation, Eggenstein-Leopoldshafen (Germany, F.R.).
Town and Country Planning (Windscale and Calder Works) Special Development Order 1978.
1978, 3p
U.S. Sales Only.

This Order grants planning permission subject to conditions for the erection of a plant for the reprocessing of spent uranium oxide fuels that support site services on land owned by British Nuclear Fuels Limited at the Windscale and Calder Works, Cumbria. It was made under the Town and Country Planning Act 1971 and deals with the 'non-nuclear aspects of this development'. Installation and operation of the plant will require a nuclear site licence under the Nuclear Installations Act 1965, and any discharge of radioactive waste will require an authorisation under the Radioactive Substances Act 1960. (Atomindex citation 10:421641)

INIS-mf-4619 PC **A02**/MF **A01**
Oskarshamnsverkets Kraftgrupp A.B., Stockholm (Sweden).
Consequences of New Swedish Legislation on Operating Licenses.
O. Gimstedt. 1978, 18p CONF-780584-5
International conference on regulating nuclear energy, Brussels, Belgium, 16 May 1978.
U.S. Sales Only.

The new Swedish Act of 1977 introduced the requirement for a special permit for loading nuclear reactors with fuel. The author, in addition to analysing the Act, recalls the practical context within which it was adopted and examines in detail the measures to be taken by operators to meet these new requirements. The most important one concerns the method and the means for disposing of the radioactive waste produced by nuclear power plants. (Atomindex citation 10:421626)

K/ET-174 PC **A03**/MF **A01**
Oak Ridge Gaseous Diffusion Plant, TN.
Analysis of a Non-Isothermal Gas Stripper with Volatile Solvent.
M. J. Stephenson. Aug 79, 31p CONF-791108-13
Contract W-7405-ENG-26
72. AICHE meeting, San Francisco, CA, USA, 25 Nov 1979.

The experimental and theoretical analysis of a non-isothermal packed column is given. A soluble gas concentration peak was found in all tests resulting from gross internal column condensation and reflux of the stripping vapor. A model is presented based on the conventional two-film mass and heat transfer theory. A combination absorber-stripper column is described that is based on the internal peaking phenomenon. (ERA citation 05:009707)

KBS-TR-109 PC **A03**/MF **A01**
Kaernbraenslesaekerhet, Stockholm (Sweden).
Leachable Gap Activities.
L. Devell, and R. Hesboel. Oct 78, 26p
In Swedish.
U.S. Sales Only.

In the event of ground water penetration into fuel pins after ultimate disposal in crystalline rock a certain fraction of the volatile fission products iodine-129 and cesium-135 may be leached from the fuel within a shorter time period than the rest of the fuel. This fraction based on gap activities and leach experiments has been estimated to be: For BWR-fuel 0.1-1 per cent; and for PWR-fuel 1-10 per cent, for both isotopes. (Atomindex citation 10:461955)

KBS-TR-114 PC **A03**/MF **A01**
Kaernbraenslesaekerhet, Stockholm (Sweden).
Gamma-Radiolysis of Organic Compounds and alpha-Radiolysis of Water.
H. Christensen. Sep 78, 32p
In Swedish, English.
U.S. Sales Only.

This KBS-report is a collection of five technical reports. Various radiolytic problems in connection with the disposal of high-active waste are dealt with. The English titles of the five reports are: 1) Radiolysis of fulvic acids; 2) Radiolysis of organic compounds in bentonite; 3) alpha -radiolysis of water during the disposal of fuel without reprocessing; 4) Radiolysis of water during the disposal of unreprocessed spent fuel. Oxidation by hydrogen peroxide; 5) Formation and decomposition of hydrogen peroxide by alpha -radiolysis. These reports (in Swedish) are attached as Appendices A-E. (Atomindex citation 10:461944)

KBS-TR-119 PC **A03**/MF **A01**
Kaernbraenslesaekerhet, Stockholm (Sweden).
Final Storage in Concrete of Activated Metal Parts.
L. Romben, and K. Tuutti. Jul 78, 42p
In Swedish.
U.S. Sales Only.

A part of the medium-level nuclear waste problem is the disposal of metal parts which have been activated during use in nuclear reactors. Some alloys contain Ni-59 with a half -life or 75000 years. A proposed method for final disposal consists in storing the waste in rock tunnels at a depth of 300-500 m inside containers which are surrounded by a buffer consisting of compacted quartz-bentonite mixture. This paper deals with the possibilities to use containers made of concrete and designed as cubic boxes enclosing the waste material cast and incorporated into cement mortar matrix. Special regard is given to the containment problem in relation to the mechanical and chemical processes that are operating. A calculation of the rate of release of Ni-59 through the walls of a container has given a figure of about 10 exp -5 kg Ni per year for undeteriorated container walls. In 6 appendices the sizes of different quantities describing the mechanical and chemical processes which are operating in this containment problem are given. (Atomindex citation 10:461980)

KBS-TR-39 PC **A07**/MF **A01**
Kaernbraenslesaekerhet, Stockholm (Sweden).
Study of the Encapsulation of Spent Nuclear Fuels for Final Storage Without Reprocessing.
B. Loennerberg. Sep 78, 138p
In Swedish.
U.S. Sales Only.

The second part of the KBS project deals with final storage of spent nuclear fuel without reprocessing. ASEA-ATOM has contributed to this part with a study of the incapsulation process before the final storage in bedrock. The complete handling process is described in the main KBS report. On the following pages a short process description is given, to a certain extent supplementing the KBS report and commenting some of the chosen process stages. Additional detailed studies regarding the various process steps are reported in the enclosed appendices. The description includes the following process steps: - spent fuel cask reception from the central storage - unloading of casks - dismantling of fuel bundles - insertion of fuel rods in copper racks - placing of racks in copper capsules - filling of capsules with lead - welding of capsule lids - capsule transport to the underground final storage The handling of remaining metal parts from the fuel bundles are described as well as collection of lossed particles from damaged fuel in the process. (Atomindex citation 10:461969)

LA-8049-MS PC **A04**/MF **A01**
Los Alamos Scientific Lab., NM.
Preliminary Concepts: Materials Management in an Internationally Safeguarded Nuclear-Waste Geologic Repository.
C. A. Ostenak, W. J. Whitty, and R. J. Dietz. Nov 79, 66p
Contract W-7405-ENG-36

Preliminary concepts of materials accountability are presented for an internationally safeguarded nuclear-waste geologic repository. A hypothetical reference repository that receives nuclear waste for emplacement in a geologic medium serves to illustrate specific safeguards concepts. Nuclear wastes received at the reference repository derive from prior fuel-cycle operations. Alternative safeguards techniques ranging from item accounting to nondestructive assay and waste characteristics that affect the necessary level of safeguards are examined. Downgrading of safeguards prior to shipment to the repository is recommended whenever possible. The point in the waste cycle where international safeguards may be terminate depends on the fissile content, feasibility of separation, and practicable recoverability of the waste: termination may not be possible if spent fuels are declared as waste. (ERA citation 05:008155)

LA-8052-MS PC **A03**/MF **A01**
Los Alamos Scientific Lab., NM.
Evaluation Procedure for Radioactive Waste Treatment Processes.
W. J. Whitty. Nov 79, 28p
Contract W-7405-ENG-36

An aspect of the Los Alamos Scientific Laboratory's nuclear waste management R and D programs has been to develop an evaluation procedure for radioactive waste treatment processes. This report describes the process evaluation method. Process worth is expressed as a numerical index called the Figure-of-Merit (FOM), which is computed using a hierarchial, linear, additive, scoring model with constant criteria weights and nonlinear value functions. A numerical example is used to demonstrate the procedure and to point out some of its strengths and weaknesses. Potential modifications and extensions are discussed, and an extensive reference list is included. (ERA citation 05:011335)

LA-8149-PR PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
Fission Product Release. Progress Report, July 1-September 30, 1979.
A. E. Norris. Nov 79, 18p
Contracts W-7405-ENG-36, EY-76-C-06-1

Experiments are being performed to measure the effects of aqueous reducing conditions, in comparison to oxidizing conditions, on the rate of dissolution of UO sub 2 and on the release of fission products from spent fuel element wafers. This quarter we determined that equilibrium or pseudoequilibrium conditions are established between the surface of the spent fuel wafers and the leachant solutions after a contact time of 20 days. An experiment was performed to measure the rate of dissolution of powdered UO sub 2 under reducing conditions, in which the UO sub 2 was treated just before the start of the experiment to remove surface oxygen. The rate of dissolution measured was two orders of magnitude higher than observed in a similar experiment in which no precautions were taken to remove surface oxygen from the UO sub 2 . The reason for the differences in these two experiments is not understood. The surface area

analyzer ordered for this program was delivered and found to function satisfactorily. It is being adapted for use in a hot cell. (ERA citation 05:011317)

LA-8152-PR PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
Research and Development Related to the Nevada Nuclear Waste Storage Investigations. Progress Report, July 1-September 30, 1979.
B. M. Crowe. Nov 79, 14p
Contract W-7405-ENG-36

Sorption under anoxic conditions is reported for core samples of tuff from exploratory drill hole UE25a-1. Sorption for Sr, Cs, Ba, Ce, and Eu is somewhat lower in pure nitrogen than in ambient atmosphere, but generally by less than a factor of two. U and Tc sorb poorly in nitrogen; however, an increase over atmospheric conditions is noted for Tc. Final results for sorption of Pu and Am on core samples from drill hole J-13 are presented, and problems with Am are discussed. Ground water composition is found to be a major factor in sorption. Autoradiography indicates that Pu sorbs indiscriminately on rock thin sections and that Np deposits in aggregate form. Zeolite minerals are present within two distinct horizons of tuff in the stratigraphic section penetrated by exploratory drill hole UE25a-1. The horizons occur in low density tuff (partially to nonwelded and bedded tuff) within the lower part of and stratigraphically below Paintbrush Tuff. Zeolite minerals include clinoptilolite and minor amounts of low silica, high alkali mordenite. The zeolite is characteristic of low temperature (<100 exp 0 C) ground water alteration of glass in an open hydrologic system. Prototype containment vessels for the hydrothermal soak tests have been assembled and tested. Regional studies of the occurrence and tectonic setting of Plio-Pleistocene age basaltic volcanic centers of the southern Great Basin are in progress. Revised volcanic disruption probability calculations for a 60-km radius circle around Yucca Mountain fall into the range of 10 exp -9 /year. Petrographic and geochemical data for the basalts of Crater Flat show a strong control of basalt type with structural setting. Models of crystal-liquid fractionation of the basalts of Crater Flat using observed phenocryst phases cannot account for chemical variations of basalt types. (ERA citation 05:009719)

LA-8153-PR PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
Aerosol Sampling and Characterization for Hazard Evaluation. Progress Report, October 1, 1977-September 30, 1978.
R. C. Scripsick, M. I. Tillery, R. G. Stafford, and P. O. Romero. Nov 79, 16p
Contract W-7405-ENG-36

Measurements of the dilution of air contaminants between worker breathing zone and area air samplers were made by releasing a test fluorescent aerosol in workrooms equipped with aerosol surveillance systems. These data were used to evaluate performance and suggest improvements in design of alarming air monitor systems. In one workroom studied, average half-hour breathing zone air concentration needed to trigger alarm was found to be 960 times the maximum permissible air concentration for occupational exposure to soluble exp 239 Pu (MPC/sub a/). It was shown that alternative monitor placement in this room could result in decreasing average triggering concentration to 354 times the MPC/sub a/. Analysis of data from impaction-autoradiographic sizing comparison studies showed average disintegration to track ratio called track efficiency factor, to be 2.7 +- 0.4. (ERA citation 05:012479)

LA-8230-MS PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
Heat Pipe Cooling System for Underground, Radioactive Waste Storage Tanks.
K. C. Cooper, and F. C. Prenger. Feb 80, 21p
Contract W-7405-ENG-36

An array of 37 heat pipes inserted through the central hole at the top of a radioactive waste storage tank will remove 100,000 Btu/h with a heat sink of 70 exp 0 F atmospheric air. Heat transfer inside the tank to the heat pipe is by natural convection. Heat rejection to outside air utilizes a blower to force air past the heat pipe condenser. The heat pipe evaporator section is axially finned, and is constructed of stainless steel. The working fluid is ammonia. The finned pipes are individually shrouded and extend 35 ft down into the tank air space. The hot tank air enters the shroud at the top of the tank and flows downward as it is cooled, with the resulting increased density furnishing the pressure difference for circulation. The cooled air discharges at the center of the tank above the sludge surface, flows radially outward, and picks up heat from the radioactive sludge. At the tank wall the heated air rises and then flows inward to comple the cycle. (ERA citation 05:013160)

LBL-9426 PC **A02**/MF **A01**
California Univ., Berkeley. Lawrence Berkeley Lab.
Experimental Results from Stripa.
M. Hood. Jun 79, 18p CONF-790683-3
Contract W-7405-ENG-48
ONWI-LLL workshop on thermomechanical modeling for a hard rock repository, Berkeley, CA, USA, 25 Jun 1979.

The results indicate that the temperature fields in a rock mass containing geologic discontinuities can be predicted accurately using the simple theory of heat conduction. Geologic discontinuities appear to introduce significant nonlinear thermomechanical deformation into the rock mass, as a result of which the thermally induced displacements are much less than those predicted by the simple theory of thermo-elasticity. In addition, the assumption that the rock properties are temperature independent appears to increase the values predicted for these displacements significantly. Therefore, it is important that the temperature dependence of these properties is known and that these values be used in the calculations. The onset of significant thermal spalling along the walls of the heater boreholes appears to be related to conditions where the maximum induced compressive stress exceeds the uniaxial compressive strength of the rock. 7 figures. (ERA citation 05:011347)

LBL-9903 PC **A02**/MF **A01**
California Univ., Berkeley. Lawrence Berkeley Lab.
Role of Large-Scale Permeability Measurements in Fractured Rock and Their Application at Stripa.
P. A. Witherspoon, C. R. Wilson, J. C. S. Long, A. O. DuBois, and J. E. Gale. Oct 79, 11p CONF-791112-26
Contract W-7405-ENG-48
Symposium on the scientific basis for nuclear waste management, Boston, MA, USA, 26 Nov 1979.

Completion of the macropermeability experiment will provide: (i) a direct, in situ measurement of the permeability of 10 exp 5 to 10 exp 6 m exp 3 of rock; (ii) a potential method for confirming the analysis of a series of small scale permeability tests performed in surface and underground boreholes; (iii) a better understanding of the effect to open borehole zone length on pressure measurement; (iv) increased volume in fractured rock; (v) a basis for evaluating the ventilation technique for flow measurement in large scale testing of low permeability rocks. (ERA citation 05:008156)

MLM-2663(TR) PC **A02**/MF **A01**
Keuring van Electrotechnische Materialen N.V., Arnhem (Netherlands).
Combustion of Waste in a 60-Liter Drum. Status Report, March 1978.
J. Matteman. 25 Oct 79, 18p
Contract EY-76-C-04-0053
Translation source information not available.

A pilot experiment on combustion of wastes from nuclear power plants was conducted using a 60-liter drum in place of a 200-liter drum. It is possible to feed waste to it without producing smoke. Continuous stoking produces conditions approaching complete combustion. Volume reduction factors are 25 to 75. HCl and fly ash can be removed using a dry gas cleaning system. The use of the installation for low-level radwaste is discussed. (ERA citation 05:008152)

MLM-2670 PC **A02**/MF **A01**
Mound Facility, Miamisburg, OH.
Pelletized Waste Form Demonstration Program: April-September 1979.
E. L. Lewis, and R. F. Herbert, Jr. 7 Dec 79, 25p
Contract EY-76-C-04-0053

During the last half of FY-1979, feasibility studies involving hot pilot-scale experiments were conducted. Sludge from the defense cyclone incinerator system was calcined and then successfully immobilized in a Portland cement matrix. This was accomplished mainly through a designed experiment in which the effects of seven variables upon compressive strength were studied. Physical and chemical properties of the sludge were also determined. Leachability and radiolysis testing of ash/cement and sludge/cement pellets was done at Mound Facility, and offsite radiolysis tests were completed at Savannah River Laboratory. Leachability data obtained indicate that leach rates are greater at ambient temperature than at 70 exp 0 C. The leach rates were very small with < 0.01% of the PuO sub 2 leached after 20 days. Radiolysis results from SRL indicated a very low hydrogen gas generation rate, G/sub(H sub 2)/, caused by radiolysis of water present in pellets. Recent irradiation tests at Mound verify these results, and pressed waste/cement pellets appear to be an excellent waste form based on low gas generation rates. (ERA citation 05:011336)

NVO-196-12 PC **A04**/MF **A01**
Department of Energy, Las Vegas, NV. Nevada Operations Office.
Nevada Nuclear Waste Storage Investigations. Quarterly Report, July-September 1979.
Dec 79, 62p

Geohydrologic cross sections through the Kern Mountains, Lone Mountain-Weepah Hills, and Clipper Gap granitic areas indicate that the groundwater flow paths from the Kern Mountains are the longest and those from Clipper Gap the shortest. Probability of both the recurrence of volcanism and the disruption of a repository site at Yucca Mountain fall in the range of 10 exp -9 per year. Global thermomechanical calculations of the response of argillite to thermal expansion have been completed. A study of Spent Fuel Test-Climax showed that radiation exposure would not induce sufficient hydrogen production to create an explosive mixture during the five-year experiment - even without any ventilation. (ERA citation 05:011348)

ONWI-16 PC **A17**/MF **A01**
Battelle Project Management Div., Columbus, OH. Office of Nuclear Waste Isolation.
Environmental Characterization of Bedded Salt Formations and Overlying Areas of the Salina Basin.
Sep 79, 379p
Contract EY-76-C-06-1830

The suitability of the Salina Basin bedded salt region as a repository for underground disposal of radioactive wastes was reported. General information on the need for a repository, the technology development, the assessment process, a preliminary conceptual facility design, and anticipated impacts were included. The geology of the area including: stratigraphy, seismology, energy resources, and mineral resources was studied. The hydrology of the area was also studied as well as the climate. Socioeconomic studies of the area were also performed. Terrestrial and aquatic ecosystems were surveyed. (ERA citation 05:010583)

ONWI-79/E511-00300-4 PC **A06**/MF **A01**
Texas Univ. at Austin. Bureau of Economic Geology.
Locating Field Confirmation Study Areas for Isolation of Nuclear Waste in the Texas Panhandle. Annual Report, October 1, 1978-September 30, 1979.
T. C. Gustavson, C. R. Handford, M. W. Presley, R. W. Baumgardner, Jr., and S. P. Dutton. 1 Dec 79, 115p
Contract AC97-79ET44614

Since early 1977, the Bureau of Economic Geology has been evaluating several salt-bearing basins within the State of Texas as part of the national nuclear repository program. The Bureau, a research unit of the University of Texas at Austin and the State of Texas, is carrying out a long-term program to gather and interpret all geologic and hydrologic information necessary for description, delineation, and evaluation of salt-bearing strata in

the Palo Duro and Dalhart Basins of the Texas Panhandle. The program in FY 79 has been subdivided into four broad research tasks, which are addressed by a basin analysis group, a surface studies group, a geohydrology group, and a host-rock analysis group. The basin analysis group has delineated the structural and stratigraphic framework of the basins, initiated natural resource assessment, and integrated data from 8000 ft (2400 m) of core material into salt-stratigraphy models. Salt depth and thickness have been delineated for seven salt-bearing stratigraphic units. Concurrently, the surface studies group has collected ground and remotely sensed data to describe surficial processes, including salt solution, slope retreat/erosion mechanisms, geomorphic evolution, and fracture system development. The basin geohydrology group has begun evaluating both shallow and deep fluid circulation within the basins. The newly formed host-rock analysis group has initiated study of cores from two drilling sites for analysis of salt and the various lithologies overlying and interbedded with salt units. This paper, a summary report of progress in FY 79, presents principal conclusions and reviews methods used and types of data and maps generated. Topical reports, discussing various geological aspects of the Palo Duro and Dalhart Basins in detail, will be forthcoming as phases of the study are completed. (ERA citation 05:011349)

ONWI-9(3) PC **A12**/MF **A01**
Battelle Project Management Div., Columbus, OH. Office of Nuclear Waste Isolation.
Technical Progress Report, April 1-June 30, 1979.
1979, 275p
Contract EY-76-C-06-1830

Objective is to provide the technology and engineering design bases for a waste repository to isolate nuclear waste safely, with protection to the environment. This document reports progress on technology development, systems analysis, site characterization, licensing, and facility engineering. (ERA citation 05:013162)

ORNL/CSD/TM-84 PC **A03**/MF **A01**
Oak Ridge National Lab., TN.
Diffusion from Solid Cylinders.
C. W. Nestor, Jr. Jan 80, 31p
Contract W-7405-ENG-26

The problem considered is the diffusion of material from a solid cylinder initially containng a uniform concentration and immersed in a well-stirred bath which maintains the external concentration at zero. The Fourier-Bessel series form of the fraction of the original material removed from the cylinder as a function of time converges very slowly for small time. An alternate form was obtained, which converges reasonably rapidly for small time. The convergence acceleration method of P. Wynn was also used to provide an efficient method for computation. Numerical examples and program listings are included. (ERA citation 05:011350)

ORNL/TM-7065 PC **A04**/MF **A01**
Oak Ridge National Lab., TN.
Removal of Hazardous Radionuclides from Uranium Ore and/or Mill Tailings. Progress Report, October 1, 1978-September 30, 1979.
F. M. Scheitlin, and W. D. Bond. Jan 80, 68p
Contract W-7405-ENG-26

The leaching of uranium ore and mill tailings to remove radium was studied. A few scouting tests were performed to obtain data on the recovery of radium, thorium, and uranium from leach liquors and on the recycle of leaching agents. Nitric acid, hydrochloric acid, ethylenediaminetetraacetic acid (EDTA), and diethylenetriaminepentaacetic acid (DTPA) were evaluated as leachants using one sample of a western US ore and two samples of tailings obtained from different uranium mills that employ the sulfuric acid leach process. Leached solids with radium contents approaching 10 pCi/g (98% radium removal) were obtained after six stages of batch, crosscurrent leaching with 3 M HNO sub 3 at 33% concentration of solids and a temperature of 60 exp 0 C. On the basis of two-stage tests on mill tailings, 0.5 M EDTA solutions at pH values of 8.2 to 11.6 were found to be more effective, while hydrochloric acid in two- or three-stage tests was less effective than nitric acid. Solutions of 0.3 M EDTA and 0.05 M DTPA were ineffective. No important differences were observed in the leaching behavior of ore and of mill tailings derived from the same ore. The residue remaining after six stages of nitric acid leaching was relatively intractable to radium leaching with water or additional nitric acid leaching. Tests indicated that the recycle of nitric acid is chemically feasible by evaporating the leach liquors to recover unused acid and then thermally decomposing the metal salts to recover consumed acid. Radium recoveries of 99+% by carrying on barium sulfate were shown to be chemically feasible in a series of experiments with leach liquors, but processing applications would probably require methods for barium recycle and barium-radium separation. Recovery of exp 230 Th and uranium from nitrate leach liquors by tri-n-butyl phosphate extraction appears promising in initial tests. (ERA citation 05:011337)

ORNL/TM-7092 PC **A02**/MF **A01**
Oak Ridge National Lab., TN.
Cement Technology for Borehole Plugging: An Interim Report on Permeability Measurements of Cementitious Solids.
E. W. McDaniel. Jan 80, 25p
Contract W-7405-ENG-26

The permeability of borehole plug solids and plug-wall rock junctions is a property of major interest in the Borehole Plugging Program. This report describes the equipment and techniques used to determine the permeabilities of possible borehole plugging materials and presents results from tests on various cementitious solids and plug-rock combinations. The cementitious solids were made from mixtures of cement, sand, salt, fly ash, and water. Three different types of cement and four different fly ashes were used. Permeabilities ranged from a high value of 3 x 10 exp -4 darcy for a neat cement paste to a low of 5 x 10 exp -8 darcy for a saltcrete containing 30 wt % sodium chloride. Miniature boreholes were made in the following four different types of rock: Westerly granite, Dresser basalt, Sioux quartzite, and St. Cloud granodiorite. These small holes were plugged with a mix consisting of 23 wt % Type I Portland cement, 20 wt % bituminous fy ash, 43.2 wt % sand, and 13.8 wt % water. After curing for 91 days at ambient temperature, the permeability of the plug-wall rock junctions ranged from 3 x 10 exp -5 to < 1 x 10 exp -8 darcy. Three of the four miniature plugged boreholes exhibited permeabilities of < 10 microdarcys. (ERA citation 05:011351)

ORNL-5447 PC **A05**/MF **A01**
Oak Ridge National Lab., TN.
Assessment of the Radiological Impact of the Inactive Uranium-Mill Tailings at Shiprock, New Mexico.
F. F. Haywood, W. A. Goldsmith, P. M. Lantz, W. F. Fox, and W. H. Shinpaugh. Dec 79, 94p
Contract W-7405-ENG-26

Uranium-mill tailings at an inactive site near Shiprock, New Mexico, contain an estimated 950 curies (Ci) of exp 226 Ra together with its radioactive daughters. A radiological survey was conducted at this site in February 1976. Decontamination work and tailings stabilization performed at the site since that time have greatly changed conditions there and little effort was applied to quantification of potential health effects in comparison to the earlier consideration of the site at Salt Lake City. The present report delineates the radiological conditions that existed at the time of the survey including information on the surface and below-surface distribution of exp 226 Ra. The data presented support the conclusion that diffusion of radon and inhalation of radon daughters is the principal mode of exposure of offsite population groups. (ERA citation 05:011369)

ORNL-5449 PC **A04**/MF **A01**
Oak Ridge National Lab., TN.
Assessment of the Radiological Impact of the Inactive Uranium-Mill Tailings at Monument Valley, Arizona.
F. F. Haywood, W. A. Goldsmith, H. M. Hubbard, Jr., W. F. Fox, and W. H. Shinpaugh. Dec 79, 74p
Contract W-7405-ENG-26

Results of a radiological survey that was conducted at the inactive uranium-mill site at Monument Valley, Arizona, in March 1976, in cooperation with a team from Ford, Bacon and Davis Utah Inc., are presented. Consideration of these data and of previously published information on radiological conditions at the site lead to the conclusion that potential health effects from exposure to radionuclides in the mill tailings are relatively small. The occupants of three residences within 0.8 km (0.5 mile) of the tailings constitute the principal population at risk, but direct gamma-exposure rate measurements near the two residences closest to the tailings and calculations of radon dispersion indicate that the tailings do not raise either pathway of radiation exposure significantly above the background level. Data are not available to evaluate fully other possible exposure pathways, but the available information indicates that it is unlikely that doses through these pathways will add significantly to the total population dose. The low estimates of potential health effects from exposure to direct radiation and to exposure to radionuclides in the Monument Valley tailings piles are ascribed to the low exp 226 Ra inventory, to almost complete absence of small particles that are readily moved by wind and water, and to a small population in the vicinity of the tailings. (ERA citation 05:011370)

ORNL-5450 PC **A05**/MF **A01**
Oak Ridge National Lab., TN.
Radiological Survey of the Inactive Uranium-Mill Tailings at Tuba City, Arizona.
F. F. Haywood, T. D. Jones, H. M. Hubbard, Jr., B. S. Ellis, and W. H. Shinpaugh. Jan 80, 79p
Contract W-7405-ENG-26

Results of a radiological survey of the inactive uranium-mill site at Tuba City, Arizona, conducted in March 1976, are presented. Spread of tailings was detected in all directions by means of direct gamma measurements at 1 m above the ground and by determinations of the exp 226 Ra concentration in surface soil and sediment samples. In the direction toward which prevailing winds blow, the northeast, evidence of transportation of tailings was found at least 3.2 km from the tailings pile. Toward the north, south, and west, the spread was 300 to 400 m. Evidence of movement of tailings by water to offsite locations was also found. The concentration of exp 226 Ra in all water samples was well below the concentration guide for drinking water. The calculated subsoil distribution of exp 226 Ra in 14 holes, based on gamma monitoring data obtained by Ford, Bacon and Davis Utah Inc., is presented graphically and compared with available analytical data. (ERA citation 05:012511)

PNL-SA-6768 PC **A02**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Full-Scale In-Can Melter Demonstration for Vitrification of Nuclear Waste.
H. T. Blair. Jan 79, 19p CONF-780622-82
Contract EY-76-C-06-1830
ANS annual meeting, San Diego, CA, USA, 18 Jun 1978.

A full-scale, nonradioactive in-can melter was made operational in April of 1977 at Pacific Northwest Laboratory (PNL). The furnace's six independently controlled hot zones are capable of providing 30 kW each at 1200 exp 0 C and are able to accommodate canisters up to 28 in. in dia and 7.5 ft tall. Several new system concepts were demonstrated with this equipment. These included supporting the canister from the bottom, placing the entire can within the furnace, and charging the melter through a water-cooled spout. These new concepts allowed one to eliminate accumulations both of batch over the top of the heat transfer plates and of unvitrified waste in the top of the can by using a test batch of simulated acid waste composition combined with borosilicate glass former; one was able to attain a melting rate of 117 kg/h in a 28-in.-dia canister. A 10-day continuous run was also made in conjunction with a heated wall spray calciner to demonstrate equipment reliability and operability. In addition, the operation of the in-can melting process was demonstrated using only remote monitoing equipment outside of the canister. (ERA citation 05:009709)

PNL-SA-7243 PC **A02**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Waste Isolation Safety Assessment Program.
A. Brandstetter, and M. A. Harwell. May 79, 15p
IAEA-SM-243/35, CONF-790711-4

Contract EY-76-C-06-1830
International symposium on underground disposal of radioactive wastes, Otaniemi, Finland, 2 Jul 1979.

Associated with commercial nuclear power production in the United States is the generation of potentially hazardous radioactive wastes. The Department of Energy (DOE), through the National Waste Terminal Storage (NWTS) Program, is seeking to develop nuclear waste isolation systems in geologic formations that will preclude contact with the biosphere of waste radionuclides in concentrations which are sufficient to cause deleterious impact on humans or their environments. Comprehensive analyses of specific isolation systems are needed to assess the expectations of meeting that objective. The Waste Isolation Safety Assessment Program (WISAP) has been established at the Pacific Northwest Laboratory (operated by Battelle Memorial Institute) for developing the capability of making those analyses. Among the analyses required for isolation system evaluation is the detailed assessment of the post-closure performance of nuclear waste repositories in geologic formations. This assessment is essential, since it is concerned with aspects of the nuclear power program which previously have not been addressed. Specifically, the nature of the isolation systems (e.g., involving breach scenarios and transport through the geosphere), and the timescales necessary for isolation, dictate the development, demonstration and application of novel assessment capabilities. The assessment methodology needs to be thorough, flexible, objective, and scientifically defensible. Further, the data utilized must be accurate, documented, reproducible, and based on sound scientific principles. (ERA citation 05:011354)

PNL-SA-7245 PC **A02**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Preliminary Results on Comparison of Adsorption-Desorption Methods and Statistical Techniques to Generate Kd Predictor Equations.
R. J. Serne, D. Rai, and J. F. Relyea. 1979, 12p
Contract EY-76-C-06-1830

The radioactive waste isolation safety assessment program (WISAP) is being performed for the United States Department of Energy. A large bank of data have been collected under this program. A part of the program is devoted to the evaluation of radionuclide-geomedia interactions in order to determine the behavior of different elements in the environment. This paper introduces and briefly summarizes data collected thus far on methods of determining adsorption coefficients, thermodynamic predictions of stable solid and solution species, Kd data, and studies for determining adsorption mechanisms. (ERA citation 05:009731)

PNL-SA-7292 PC **A02**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Development of Multibarrier Nuclear Waste Forms.
Mar 79, 14p
Contract EY-76-C-06-1830

The multibarrier concept aims to separate the radionuclide-containing inner core material and the environment by the use of coatings and matrices. Two options were developed for the inner core of the multibarrier concept: supercalcine pellets and glass marbles. Supercalcine is a crystalline assemblage of mutually compatible, refractory, and leach-resistant solid solution phases incorporating high-level liquid waste ions. Supercalcine powder is produced by spray calcining the liquid waste stream to which Al sub 2 O sub 3 , CaO, SiO sub 2 , and SrO have been added. Supercalcine pellets are produced by disc pelletizing. The amorphous supercalcine crystallizes into solid solution phases after subsequent heat treatment. Based on the multibarrier processes described, several conclusions can be made: gravity sintering and vacuum casting are both applicable methods for metal matrix encapsulation. The multibarrier concept of glass marbles encapsulated in a vacuum-cast lead alloy provides enhanced inertness at a minimum increase in technological complexity. If it were desirable to develop a crystalline multibarrier waste form, uncoated sintered supercalcine pellets would offer enhanced inertness at a much lower level of technological complexity than glaze- or CVD-coated supercalcine. The 16-inch diameter pelletizer unit has enough capacity to handle the output of a large PNL spray calciner (52.5 kg of calcine/hr) and it can form spray-calcined material into pellets with diameters of 2 mm to 20 mm having strength enough to withstand handling without significant breakage.Chemical vapor deposition coating of supercalcine should be pursued only if a very high level of inertness is required. (ERA citation 05:011338)

PNL-SA-7414 PC **A02**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Processes for Production of Alternative Waste Forms.
W. A. Ross, J. M. Rusin, and J. L. McElroy. 1979, 14p CONF-790204-11
Contract EY-76-C-06-1830
Symposium on waste management and fuel cycles 1979, Tucson, AZ, USA, 28 Feb 1979.

During the past 20 years, numerous waste forms and processes have been proposed for solidification of high-level radioactive wastes (HLW). The number has increased significantly during the past 3 to 4 years. At least five factors must be considered in selecting the waste form and process method: 1) processing flexibility, 2) waste loading, 3) canister size and stability, 4) waste form inertness and stability, and 5) processing complexity. This paper describes various waste form processes and operations, and a simple system is proposed for making comparisons. This system suggests that one goal for processes would be to reduce the number of process steps, thereby providing less complex processing systems. (ERA citation 05:011339)

PNL-SA-7468 PC **A02**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Workshop on Transport Modeling for Nuclear Waste Repositories.
J. R. Raymond. Jul 77, 18p
Contract EY-76-C-06-1830

The Transport Modeling task includes developing methods to describe the transport and impact of radiocontaminants accidentally released from waste repositories; demonstrating the use of these methods; and making the methods and techniques available to the repository managers for application at specific sites. The workshop on Transfer Modeling for the Waste Isolation Safety Assessment Program was held at the Battelle Seattle Research Center on 25 and 26 July 1977. The objectives of the workshop were to: 1) discuss needs and criteria for the models, 2) obtain critiques of proposed model systems from experts in the field, and 3) obtain ideas for making models more useful to the safety assessment program. The proceedings of the workshop were presented. (ERA citation 05:011372)

PNL-SA-7540 PC **A02**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Characterization of Nuclear Waste.
A. M. Platt. 14 Feb 79, 6p CONF-790304-9
Contract EY-76-C-06-1830
19. annual ASME symposium, geological disposal of nuclear waste, Albuquerque, NM, USA, 15 Mar 1979.

Nuclear wastes which are logical candidates for deep geologic disposal include commercial (spent fuel, reprocessing) and defense wastes. It is expected that the 5250 metric tons of spent fuel discharged through the end of 1978 would increase to about 100,000 tons by the end of 2000. The individual characteristics of each waste type (spent fuel, solidified waste, defense wastes) are described in turn. (ERA citation 05:009705)

PNL-SA-7992 PC **A11**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Proceedings of the Task 2 Workshop Waste Isolation Safety Assessment Program.
D. J. Bradley. 1979, 234p
Contract EY-76-C-06-1830

The reports from the workshop on waste form release rate analysis are presented. The workshop started with overview presentations on the Office of Nuclear Waste Isolation (ONWI), the Waste Isolation Safety Assessment Program (WISAP), WISAP Task 2 (Waste Form Release Rate Analysis), and WISAP Task 4 (Sorption/Desorption Analysis). Technical presentations followed in these areas: leaching studies on spent fuels, leaching studies on high-level waste glass, waste form surface science experiments, radiation effects, and leach modeling. Separate abstracts were prepared for each. (ERA citation 05:008157)

PNL-TR-378 PC **A02**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Statement by Dr. Ernst Albrecht on the Provincial Government's Position Regarding the Planned Nuclear Waste Disposal Facility (NEZ) in Gorleben. Part II. Position Taken by the Federal Government Regarding the Policy Statement by the Niedersachsen Provincial Government on the Planned Nuclear Waste Disposal Facility in Gorleben.
6 Dec 79, 15p
Contract EY-76-C-06-1830
Translation source information not available.

Questions regarding the safety and policy aspects of the proposed DWK waste disposal center in Gorleben are discussed. The position of the Niedersachsen provincial government is that the center should not be built; instead, the salt formations should be tested and interim fuel storage facilities provided. The response of the Federal government to the Niedersachsen statement is also listed. (ERA citation 05:008174)

PNL-2774 PC **A05**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Characterization of the Hanford 300 Area Burial Grounds. Task IV. Biological Transport.
R. E. Fitzner, K. A. Gano, W. H. Rickard, and L. E. Rogers. Oct 79, 86p
Contract EY-76-C-06-1830

The characteristics of radioactive waste burial sites at the 300 area burial grounds on the Department of Energy's Hanford Site, southeastern Washington were studied. The potential vectors of radionuclide transport studied were vegetation and animals. The overall results showed a low potential for uptake and transport of radionuclides from the 300 area sites. However, additional methods to control physical and biological mechanisms may contribute to the effectiveness of waste burial practices. From the results, the Biological Transport task recommended field studies which include reduction of soil erosion and addition of biobarriers to plants and animals. Vegetation plays a major role in reducing soil erosion, and thereby maintaining the backfill over the burial sites. Of the several species found on the 300 area sites, cheatgrass (Bromus tectorum) appears to be the most desirable as a cover. Besides retarding erosion, it has a shallow root system (does not easily penetrate buried material); it has a low affinity for radionuclide uptake; and its tissues are not easily blown away. Small mammals (specifically, mice) appear to have the most potential for radionuclide exposure and uptake. Small mammals were live-trapped within 10 x 10-meter trap grids. Each animal trapped was surgically implanted with a thermoluminescent dosimeter. When the animal was recaptured, the dosimeter was removed and read for exposure. Exposures were reported in milli-Roentgens. The most consistently trapped small mammals were the Great Basin pocket mouse (Perognathus parvus) and the deer mouse (Peromyscus maniculatus). Results from the dosimeter readings showed that some of those animals had higher than background exposures. Biobarriers to animals could be considered as a mechanism to reduce the potential for radionuclide transport. (ERA citation 05:009729)

PNL-2851 PC **A09**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Summary of FY-1978 Consultant Input for Scenario Methodology Development.
B. L. Scott, G. L. Benson, R. A. Craig, and M. A. Harwell. Nov 79, 180p
Contract EY-76-C-06-1830

Associated with commercial nuclear power production in the United States is the generation of potentially hazardous radioactive waste products. The Department of Energy (DOE), through the National Waste Terminal Storage (NWTS) Program, is seeking to develop nuclear waste isolation sys-

tems in geologic formations. These underground waste isolation systems will preclude contact with the biosphere of waste radionuclides in concentrations which are sufficient to cause deleterious impact on humans or their environments. Comprehensive analyses of specific isolation systems are needed to assess the posticlosure expectations of the systems. Assessment of Effectiveness of Geologic Isolation Systems (AEGIS) program has been established for developing the capability of making those analyses. The assessment of repository post-closure safety has two basic components: identification and analyses of breach scenarios and the pattern of events and processes causing each breach, and identification and analyses of the environmental consequences of radionuclide transport and interactions subsequent to a repository breach. Specific processes and events which might affect potential repository sites and, the rates and probabilities for those phenomena are presented. The description of the system interactions and synergisms and of the repository system as an evolving and continuing process are included. Much of the preliminary information derived from the FY-1978 research effort is summarized in this document. This summary report contains information pertaining to the following areas of study: climatology, geomorphology, glaciology, hydrology, meteorites, sea level fluctuations, structural geology and volcanology. (ERA citation 05:011352)

PNL-3050-2 PC **A03**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Research and Development Activities: High-Level Waste Immobilization Program. Quarterly Progress Report, April-June 1979.
J. L. McElroy, J. E. Mendel, W. F. Bonner, and M. H. Henry. Dec 79, 48p
Contract EY-76-C-06-1830

Test results are available on 21 out of a total of 65 glass compositions in a generic study of composition effects on waste glass properties such as Soxhlet leach rate, viscosity, electrical conductivity, and volatility. Preliminary results indicate the leaching behavior of a Cermet waste form prepared at ORNL is similar to that of waste glass and supercalcine. Scanning transmission electron microscopy has confirmed that supercalcine contains up to 10 vol% glassy phase and that small fractions of Cs, Sr, and rare earth reside in the glassy phase. Two long-term runs were completed in the ceramic melter coupled directly to the full-scale spray calciner. Two new ceramic melters were put into operation. A preliminary test in the small spray calciner indicates that coal, which is present in some Savannah River Plant wastes, is only partially decomposed during spray calcination. 15 figures, 11 tables. (ERA citation 05:013156)

PNL-3070 PC **A04**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Comparison of INTERA and WISAP Consequence Model Application. Assessment of Effectiveness of Geologic Isolation Systems.
C. R. Cole, and F. W. Bond. Jan 80, 66p
Contract EY-76-C-06-1830

The Waste Isolation Safety Assessment Program (WISAP) is being conducted to develop, for the Office of Nuclear Waste Isolation (ONWI), the methodology necessary to perform long-term safety assessments of deep geologic repositories. The Waste Isolation Pilot Plant (WIPP) program is developing a nuclear waste storage facility and is performing assessments of that site. WISAP and WIPP have similar, though independent, methodologies for assessing the consequences of a repository breach subsequent to closure. Intera Environmental Consultants are under contract to Sandia Laboratories to conduct the hydrologic and transport modeling for the WIPP Site Release Consequence Analysis (WIPP EIS/ER 1978). To provide a mutual benchmark check of the radionuclide and ground-water transport models of these two programs, ONWI has requested WISAP to perform a release consequence analysis based on the WIPP site, utilizing the same data and conceptual model which the WIPP program used for its environmental assessments. Therefore, only a portion of the WISAP methodology was used; specifically, only WISAP geotransport models were exercised. The other important parts of WISAP assessment methodology were not used, so that WISAP did not develop the scenario nor did WISAP interpret the field data to develop the conceptual model of the geohydrology of the WIPP site. The results of the comparative assessment are presented. Although the different models required slightly different input parameters, the results of the hydrologic simulations show a very close correspondence between the WISAP and WIPP predictions. This was as expected, since the various hydrologic codes available essentially utilize and solve the same basic flow equations. In addition, this report presents the results of the WISAP radionuclide transport model simulations. These results will provide the basis for comparison with WIPP results when these become available. (ERA citation 05:013164)

PNL-3129 PC **A05**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Environmental Control Aspects for Fabrication, Reprocessing and Waste Disposal of Alternative LWR and LMFBR Fuels.
A. M. Nolan, M. A. Lewallen, and G. W. McNair. Nov 79, 94p
Contract EY-76-C-06-1830

Environmental control aspects of alternative fuel cycles have been analyzed by evaluating fabrication, reprocessing, and waste disposal operations. Various indices have been used to assess potential environmental control requirements. For the fabrication and reprocessing operations, 50-year dose commitments were used. Waste disposal was evaluated by comparing projected nuclide concentrations in ground water at various time periods with maximum permissible concentrations (MPCs). Three different fabrication plants were analyzed: a fuel fabrication plant (FFP) to produce low-activity uranium and uranium-thorium fuel rods; a plutonium fuel refabrication plant (PFRFP) to produce plutonium-uranium and plutonium-thorium fuel rods; and a uranium fuel refabrication plant (UFRFP) to produce fuel rods containing the high-activity isotopes exp 232 U and exp 233 U. Each plant's dose commitments are discussed separately. Source terms for the analysis of effluents from the fuel reprocessing plant (FRP) were calculated using the fuel burnup codes LEOPARD, CINDER and ORIGEN. Effluent quantities are estimated for each fuel type. Bedded salt was chosen for the waste repository analysis. The repository site is modeled on the Waste Isolation Pilot Program site in New Mexico. Wastes assumed to be stored in the repository include high-level vitrified waste from the FRP, packaged fuel residue from the FRP, and transuranic (TRU) contaminated wastes from the FFP, PFRFP, and UFRFP. The potential environmental significance was determined by estimating the ground-water concentrations of the various nuclides over a time span of a million years. The MPC for each nuclide was used along with the estimated ground-water concentration to generate a biohazard index for the comparison among fuel compositions. (ERA citation 05:009730)

PNL-3139 PC **A04**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Status of Sorption Information Retrieval System.
D. D. Hostetler, R. J. Serne, and A. Brandstetter. Sep 79, 64p
Contract EY-76-C-06-1830

A Sorption Information Retrieval System (SIRS) is being designed to provide an efficient, computerized, data base for information on radionuclide sorption in geologic media. The data bank will include Kd values for a large number of radionuclides occurring in radioactive wastes originating from the commercial nuclear power industry. Kd values determined to date span several ground-water compositions and a wide variety of rock types and minerals. The data system will not only include Kd values, but also background information on the experiments themselves. This will allow the potential user to retrieve not only the Kd values of interest but also sufficient information to evaluate the accuracy and usefulness of the data. During FY-1979, the logic structure of the system was designed, the software programmed, the data categories selected, and the data format specified. About 40% of the approximately 5000 Kd experiments performed by the Waste Isolation Safety Assessment Program (WISAP) and its subcontractors during FY-1977 and FY-1978 have been evaluated, coded and keypunched. Additional software improvements and system testing are needed before the system will be fully operational. A workshop requested by the NEA was held to discuss potential international participation in the data system. (ERA citation 05:009721)

PNL-3152 PC **A06**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Leaching of Actinides and Technetium from Simulated High-Level Waste Glass.
D. J. Bradley, C. O. Harvey, and R. P. Turcotte. Aug 79, 104p
Contract EY-76-C-06-1830

Leach tests were conducted using a modified version of the IAEA procedure to study the behavior of glass waste-solution interactions. Release rates were determined for Tc, U, Np, Pu, Am, Cm, and Si in the following solutions: WIPP B salt brine, NaCl (287 g/l), NaCl (1.76 g/1), CaCl sub 2 (1.66 g/l), NaHCO sub 3 (2.52 g/l), and deionized water. The leach rates for all elements decreased an order of magnitude from their initial values during the first 20 to 30 days leaching time. The sodium bicarbonate solution produced the highest elemental release rates, while the saturated salt brine and deionized water in general gave the lowest release. Technetium has the highest initial release of all elements studied. The technetium release rates, however, decreased by over four orders of magnitude in 150 days of leaching time. In the prepared glass, technetium was phase separated, concentrating on internal pore surfaces. Neptunium, in all cases except CaCl sub 2 solution, shows the highest actinide release rate. In general, curium and uranium have the lowest release rates. The range of actinide release rates is from 10 exp-5 to 10 exp -8 g/cm exp 2 /day. 25 figures, 7 tables. (ERA citation 05:011329)

PNL-3160-1 PC **A03**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Variable Thickness Transient Ground-Water Flow Model. Volume 1. Formulation.
A. E. Reisenauer. Dec 79, 35p
Contract EY-76-C-06-1830

Mathematical formulation for the variable thickness transient (VTT) model of an aquifer system is presented. The basic assumptions are described. Specific data requirements for the physical parameters are discussed. The boundary definitions and solution techniques of the numerical formulation of the system of equations are presented. (ERA citation 05:014243)

PNL-3176 PC **A07**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Exp 85 Kr Management Trade-Offs: A Perspective to Total Radiation Dose Commitment.
P. J. Mellinger, G. R. Hoenes, L. W. Brackenbush, and J. Greenborg. Jan 80, 126p
Contract EY-76-C-06-1830

Radiological consequences arising from the trade-offs for exp 85 Kr waste management from possible nuclear fuel resource recovery activities have been investigated. The reference management technique is to release all the waste gas to the atmosphere where it is diluted and dispersed. A potential alternative is to collect, concentrate, package and submit the gas to long-term storage. This study compares the radiation dose commitment to the public and to the occupationally exposed work force from these alternatives. The results indicate that it makes little difference to the magnitude of the world population dose whether exp 85 Kr is captured and stored or chronically released to the environment. Further, comparisons of radiation exposures (for the purpose of estimating health effects) at very low dose rates to very large populations with exposures to a small number of occupationally exposed workers who each receive much higher dose rates may be misleading. Finally, cost studies (EPA 1976 and DOE 1979a) show that inordinate amounts of money will be required to lower this already extremely small 80-year cumulative world population dose of 0.05 mrem/person (<0.001% of natural background radiation for the same time period). (ERA citation 05:011330)

PNL-3222 PC **A03**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.

Master Schedule for CY-1980 Hanford Environmental Surveillance Routine Program.
P. J. Blumer, J. R. Houston, and P. A. Eddy. Dec 79, 41p
Contract EY-76-C-06-1830

The current schedule of data collection for the routine environmental surveillance program at the Hanford Site is presented. The enviromental surveillance program objectives are to evaluate the levels of radioactive and nonradioactive pollutants in the Hanford environs, as required in Manual Chapter 0513, and to monitor Hanford operations for compliance with applicable environmental criteria given in Manual Chapter 0524 and Washington State Water Quality Standards. Data are reported on the following topics: air; Columbia River; sanitary water; surface water; ground water; foodstuffs; wildlife; soil and vegetation; external radiation measurement; portable instrument surveys; and surveillance of waste disposal sites;. (ERA citation 05:012481)

PNL-3227 PC **A05**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Geophysical Surveys for Buried Waste Detection at the Idaho National Engineering Laboratory.
G. A. Sandness, J. L. Rising, and J. R. Kimbrough. Dec 79, 77p
Contract EY-76-C-06-1830

This report describes a series of geophysical surveys performed at the Idaho National Engineering Laboratory (INEL). The main purpose of the surveys was to evaluate techniques, principally ground-penetrating radar, for detecting and mapping radioactive wastes buried in shallow trenches and pits. A second purpose was to determine the feasibility of using ground-penetrating radar to measure the depth of basalt bedrock. A prototype geophysical survey system developed by the US Department of Energy's Pacific Northwest Laboratory was used for this study. Radar, magnetometer, and metal detector measurements were made at three sites in the Radioactive Waste Management Complex (RWMC) at INEL. Radar measurements were made at fourth site adjacent to the RWMC. The combination of three geophysical methods was shown to provide considerable information about the distribution of buried waste materials. The tests confirmed the potential effectiveness of the radar method, but they also pointed out the need for continued research and development in ground-penetrating radar technology. The radar system tested in this study appears to be capable of measuring the depth to basalt in the vicinity of the RWMC. (ERA citation 05:011353)

RFP-2862 PC **A05**/MF **A01**
Atomics International Div., Golden, CO. Rocky Flats Plant.
National Waste Terminal Storage Program: Containment System Concepts for Transporting Type B Quantities of Transuranic Waste.
R. J. Rushton, and R. J. Merlini. 14 Sep 79, 94p
Contract EY-76-C-04-3533

A series of shipping containment system preliminary concepts for Type B quantities of transuranic waste have been formulated. The concepts were based on hypothetical accident protection requirements, potential waste forms, and selected hardware design/considerations. The concepts consist of suggested waste system containment configurations and construction material suggestions. Analysis of the concepts, based on such features as fabrication ease and cost, utility, and payload efficiency, revealed that concepts utilizing processed waste forms and/or disposable waste packages to provide a major portion of the required accident protection are most favorable. (ERA citation 05:005433)

RHO-BWI-LD-22 PC **A05**/MF **A01**
Atomics International Div., Richland, WA. Rockwell Hanford Operations.
Site Identification Presentation: Basalt Waste Isolation Project.
Nov 79, 77p
Contract EY-77-C-06-1030

The final step in the site identification process for the Basalt Waste Isolation Project is described. The candidate sites are identified. The site identification methodology is presented. The general objectives which must be met in selecting the final site are listed. Considerations used in the screening process are also listed. Summary tables of the guidelines used are included. (ERA citation 05:013169)

RHO-BWI-79-100 PC **A12**/MF **A01**
Atomics International Div., Richland, WA. Rockwell Hanford Operations.
Basalt Waste Isolation Project. Annual Report, Fiscal Year 1979.
Nov 79, 265p
Contract EY-77-C-06-1030

This project is aimed at examining the feasibility and providing the technology to design and construct a radwaste repository in basalt formations beneath and within the Hanford Site. The project is divided into seven areas: systems integration, geosciences, hydrologic studies, engineered barriers, near-surface test facility, engineering testing, and repository engineering. This annual report summarizes key investigations in these seven areas. (ERA citation 05:013167)

RHO-CD-783 PC **A02**/MF **A01**
Atomics International Div., Richland, WA. Rockwell Hanford Operations.
Theoretical Considerations in Solid Bowl Centrifugation.
R. T. Hamilton. 24 Aug 79, 25p
Contract EY-77-C-06-1030

A combination of literature survey and independent analysis determined three relationships for the prediction of the critical (or minimum recoverable) particle size in a solid bowl centrifuge. The relationships were derived based on three different theories of fluid behavior within the centrifuge; (1) laminar film flow (laminar film model), (2) plug flow (Sharples Model), and parabolic flow (modified Sharples Model). The critical particle size for the centrifuge used in Cs-PTA recovery in the CAW process predicted by the three relationships range from 0.19 to 0.34 mu m (1 mu m = 10 exp -6 m). The laminar film model gives the most conservative estimate of critical particle size (0.34 mu m) and the resulting relationship is recommended for use to predict solid bowl centrifuge performance. Three correction factors are incorporated into the predictive equations to account for the effects of fluid turbulence near the centrifuge feed point, fluid lag and hindered settling. Of these factors, turbulence near the feed point (which is accounted for by using an effective centrifuge length) has the greatest impact, increasing the predicted critical particle size by 15%, while the combination of fluid lag and hindered settling factors increase the recoverable particle size by 4%. The overall effect of the correction factors is an approximately 20% decrease in centrifuge effectivity. The fraction of solids smaller than the critical size range has not been reliably determined for laboratory or plant prepared Cs-PTA. In addition, the density of Cs-PTA crystals is reported to vary from 3.2 to 12 grams per cubic centimeter. (ERA citation 05:011340)

RHO-CD-810 PC **A05**/MF **A01**
Atomics International Div., Richland, WA. Rockwell Hanford Operations.
Preliminary Criteria for Shallow-Land Storage/Disposal of Low-Level Radioactive Solid Waste in an Arid Environment.
A. L. Shord. Sep 79, 81p
Contract EY-77-C-06-1030

Preliminary criteria for shallow land storage/disposal of low level radioactive solid waste in an arid environment were developed. Criteria which address the establishment and operation of a storage/disposal facility for low-level radioactive solid wastes are discussed. These were developed from the following sources: (1) a literature review of solid waste burial; (2) a review of the regulations, standards, and codes pertinent to the burial of radioactive wastes; (3) on site experience; and (4) evaluation of existing burial grounds and practices. (ERA citation 05:013170)

RHO-CD-896 PC **A06**/MF **A01**
Atomics International Div., Richland, WA. Rockwell Hanford Operations.
Review of Classification of Nine Hanford Single-Shell Questionable Integrity Tanks.
W. W. Schulz. Jan 80, 112p
Contract EY-77-C-06-1030

Based upon this latest thorough review of the historical and current data base for Tanks 107-B, 110-B, 201-B, 101-C, 110-SX, 108-T, 111-T, 101-TY, and 112-U, Rockwell finds that Tanks 107-B, 201-B, 101-C, and 112-U should be reclassified as Confirmed Leakers. The volumes of liquid waste estimated to have leaked from these four tanks are: (1) Tank 107-B, 8,000 gallons (May 1968 to August 1969); (2) Tank 201-B, 1,200 gallons (April 1968 to June 1971); (3) Tank 101-C, 17,000 to 24,000 gallons (January 1968 to December 1969); and (4) Tank 112-U, 7,000 to 10,000 gallons (February 1969 to March 1970). Tanks 110-B, 110-SX, 108-T, 111-T, and 101-TY should continue to be classified as of Questionable Integrity. (ERA citation 05:013171)

RHO-LD-79-101-D PC **A03**/MF **A01**
Atomics International Div., Richland, WA. Rockwell Hanford Operations.
Long-Term High-Level Defense Waste Technology. Progress Report, July-September 1979.
Nov 79, 37p
Contract EY-77-C-06-1030

Progress is reported in program management and support, waste preparation, and waste fixation. 3 figures, 5 tables. (ERA citation 05:013147)

SAND-79-0344 PC **A04**/MF **A01**
Sandia Labs., Albuquerque, NM.
Small Scale Heater Tests in Argillite of the Eleana Formation at the Nevada Test Site.
D. F. McVey, R. K. Thomas, and A. R. Lappin. Nov 79, 62p
Contract EY-76-C-04-0789

Near-surface heater tests were run in the Eleana Formation at the Nevada Test Site, in an effort to evaluate argillaceous rock for nuclear waste storage. The main test, which employed a full-scale heater with a thermal output approximating commercial borosilicate waste, was designed to operate for several months. Two smaller, scaled tests were run prior to the full-scale test. This report develops the thermal scaling laws, describes the pretest thermal and thermomechanical analysis conducted for these two tests, and discusses the material properties data used in the analyses. In the first test, scaled to a large heater of 3.5 kW power, computed heater temperatures were within 7% of measured values for the entire 96-hour test run. The second test, scaled to a large heater having 5.0 kW power, experienced periodic water in-flow onto the heater, which tended to damp the temperature. For the second test, the computed temperatures were within 7% of measured for the first 20 hours. After this time, the water effect became significant and the measured temperatures were 15 to 20% below those predicted. On the second test, rock surface spallation was noted in the bore hole above the heater, as predicted. The scaled tests indicated that in-situ argillite would not undergo major thermostructural failure during the follow-on, 3.5 kW, full-scale test. 24 figures, 6 tables. (ERA citation 05:009722)

SAND-79-0988C PC **A02**/MF **A01**
Sandia Labs., Albuquerque, NM.
Radionuclide Sorption Studies on Abyssal Red Clays.
K. L. Erickson. 1979, 7p CONF-791112-48
Contract EY-76-C-04-0789
Symposium on the scientific basis for nuclear waste management, Boston, MA, USA, 26 Nov 1979.

The radionuclide sorption properties of a widely distributed abyssal red clay are being experimentally investigated using batch equilibration techniques. This paper summarizes sorption equilibrium data obtained when 0.68 N NaCl solutions containing either Tc, U, Pu, Am or Cm were contacted with samples of the red clay and also summarizes some initial results from experiments designed to determine the relative selectivity of the clay for various nuclides. Under mildly oxidizing conditions, the sorption equilibrium distribution coefficients for technetium were essentially zero. At solution-

phase nuclide concentrations on the order of 10 exp -6 M and less and at solution pH values of about 6.9, the distribution coefficients for plutonium were about 3 x 10 exp 3 m1/gm and for uranium, americium, and curium were about 10 exp 5 ml/gm or greater. However, at solution pH values of about 2.7, the distribution coefficients for each of the nuclides were greatly diminished. Initial experiments conducted in order to determine the relative selectivity of the clay for cesium, barium, and cerium, indicated that the silicate phases in the clay were selective for cesium over barium and cerium. These experiments also indicated that the hydrous oxide phases were selective for cerium over barium and for barium over cesium. (ERA citation 05:013172)

SAND-79-0989C PC **A02**/MF **A01**
Sandia Labs., Albuquerque, NM.
Preliminary Rate Expressions for Analysis of Radionuclide Migration Resulting from Fluid Flow Through Jointed Media.
K. L. Erickson. 1979, 10p CONF-791112-47
Contract EY-76-C-04-0789
Symposium on the scientific basis for nuclear waste management, Boston, MA, USA, 26 Nov 1979.

A theoretical and experimental basis is being developed for analysis of radionuclide transport in jointed geologic media. Batch equilibration and rate experiments involving samples of Eleana argillite and tertiary silicic tuffs in contact with solutions containing Cs, Sr, or Pm indicated that most radionuclide sorption was associated with the surfaces of very small intergranular regions and that the rate of sorption was controlled by diffusion of the nuclides into such regions. Based on these experimental results, the continuity equations for radionuclides in the mobile and immobile phases were reduced to a model analogous to Rosen's equations for packed beds and were solved similarly. Using the model and experimental data, limited radionuclide transport analyses were made which indicated that important parameters controlling transport include the intergranular porosity and nuclide penetration depth, fracture plate spacing and length, fluid velocity and sorption distribution coefficient. Many of these parameters represent physical quantities or processes which can be quantified in the laboratory. However, fluid velocities and fracture plate spacings and lengths must be obtained from the field, and methods must be developed to establish reliable bounds for such field-determined parameters. (ERA citation 05:013173)

SAND-79-1665C PC **A02**/MF **A01**
Sandia Labs., Albuquerque, NM.
Thermal Conductivity of Rocksalt and Other Geologic Materials from the Site of the Proposed Waste Isolation Pilot Plant.
J. N. Sweet, and J. E. McCreight. 1979, 25p CONF-791134-7
Contract EY-76-C-04-0789
16. international thermal conductivity conference, Chicago, IL, USA, 7 Nov 1979.

The measurements first reported by Acton on the thermal conductivity of samples taken from a borehole at the site of the proposed nuclear waste isolation pilot plant (WIPP) near Carlsbad, NM, have been extended to include additional samples and higher temperature measurements. Samples for our measurements were taken from several depths of three wells, including the well AEC 8 from which Acton obtained his samples. These samples ranged from relatively pure rocksalt (NaCl) with small amounts of interstitial anhydrite to essentially nonsalt samples composed of gypsum or clay. The measurements in this latest series were conducted at Sandia using the longitudinal heat flow apparatus described by Acton, at the Los Alamos Scientific Laboratory (LASL) using a transient line source technique, and at Dynatech Corp., Cambridge, MA using a linear heat flow comparative technique. On the basis of these experiments, we have concluded that the thermal conductivity of materials found at the site can be predicted to an accuracy approx. +- 30% from knowledge of the composition and grain size of these materials. (ERA citation 05:011373)

SAND-79-2023C PC **A03**/MF **A01**
Sandia Labs., Albuquerque, NM.
Titanium Alloy Corrosion in Nuclear Waste Environments.
J. W. Braithwaite, N. J. Magnani, and J. W. Munford. 1980, 25p CONF-800305-5
Contract EY-76-C-04-0789
Corrosion/80 NACE meeting, Chicago, IL, USA, 6 Mar 1980.

A corrosion study has been conducted on the titanium alloys Ti-50A, TiCode 12, and Ti-Pd to evaluate their suitability as a long lifetime (300 to 600 year) canister material for the isolation of nuclear wastes. TiCode 12, selected as the primary candidate material, is shown to be very resistant to environmental attack. Results of electrochemical, general corrosion, and stress corrosion cracking experiments are presented. These data, including those from severe overtests, have shown that TiCode 12 is a viable candidate material for long-term waste isolation. 17 figures. (ERA citation 05:011356)

SAND-79-2141 PC **A02**/MF **A01**
Sandia Labs., Albuquerque, NM.
Borehole Plugging Program. Status Report, October 1, 1978-September 30, 1979.
C. L. Christensen, C. W. Cook, and C. W. Gulick. Jan 80, 24p
Contract EY-76-C-04-0789

This program is in support of the Waste Isolation Pilot Plant (WIPP) proposed for southeastern New Mexico. Current-year activities cover management, materials, instrumentation, and field tests. Proposed FY 80 activities are also outlined. (ERA citation 05:013174)

SAND-79-2262 PC **A10**/MF **A01**
Sandia Labs., Albuquerque, NM.
Proceedings of the Nuclear Materials Transportation Program Development Seminar.
1979, 224p CONF-7904121-
Contract EY-76-C-04-0789
Nuclear materials transportation program development seminar, Albuquerque, NM, USA, 18 Apr 1979.

This document includes viewographs (overview, systems developments, technology, information and institutional issues), discussions, workshop reports, points of agreement and action items, and independent summary. (ERA citation 05:013144)

SAND-80-0007/2 PC **A04**/MF **A01**
Sandia Labs., Albuquerque, NM.
Subseabed Disposal Program Plan. Volume II. FY80 Budget and Subtask Work Plans.
Jan 80, 63p
Contract EY-76-C-04-0789

This volume of the Subseabed Disposal Program Plan presents a breakdown of the master program structure by major activity. Each activity is described and accompanied by a specific cost plan schedule and a milestone plan. The costs have been compiled in the Cost Plan Schedules attached to each Subtask Work Plan. The FY 1980 budget for the Subseabed Disposal Program is summarized at the second level of the Work Breakdown Structure. The milestone plans for FY 80 are presented. The milestones can be changed only with the concurrence of the Sandia Subseabed Program Manager. (ERA citation 05:011357)

SKBF-KBS-TR-79-01 PC **A02**/MF **A01**
Svensk Kaernbraenslefoersoerjning AB, Stockholm.
Clay Particle Redistribution and Piping Phenomena in Bentonite/Quartz Buffer Material Due to High Hydraulic Gradients.
R. Pusch. Jan 79, 18p
U.S. Sales Only.

The deposition of canisters with highly radioactive wastes in tunnels at 500 m depth involves application of in siter compacted bentonite/quartz buffer material in tunnels and shafts. Such material is sometimes also specified for the deposition holes as well. One possible drawback of this procedure could be that the water which enters the buffer mass from the surrounding rock may cause erosion either by washing out tiny clay paritcles from the mass or by creating "piping" in it. Two test series were made in the laboratory to investigate the clay transporting power of percolating water. The tests show that piping and temporarily rapid water flow may take place. It requires, however, that rather extreme and improbably high gradients are produced in the tunnel fill. The tests also show that a steady homogeneous water flow does not transport clay particles through the grain matrix even under high gradients. The fact that a tunnel filled with 20 % Na bentonite does not obey Darcy's law, means that it will be practically impervious when only regional gradients are finally in operation. (Atomindex citation 10:461979)

STUDSVIK-K2-78/70 PC **A03**/MF **A01**
Studsvik Energiteknik AB, Nykoeping (Sweden).
Calculations of the Diffusion of Nuclides Through Cracks in Containers Made of Concrete.
H. Haeggblom. Dec 78, 29p
In Swedish.
U.S. Sales Only.

Active nuclear waste from Oskarshamn and Ringhals, Sweden, is encapsulated in containers made of concrete. The containers have plane surfaces. The diffusion of nuclides through the concrete as well as through an assumed crack with thicknesses of 0.1 and 1.0 mm, respectively, has been calculated with the computer code TEMPER 3. The density of nuclids outside the containers was assumed to be zero. The calculations were performed with two different values of the diffusion constant in concrete and with two different values of the retardation factor for nuclides in the crack. The results of the calculations show that the migration time through the crack varied between 18 days and 300 years depending on the different assumptions. The times before maximum migration velocities were obtained were a factor of 6 longer. (Atomindex citation 10:461958)

UCID-18502 PC **A02**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Climax Granite Test Results.
L. D. Ramspott. 15 Jan 80, 24p
Contract W-7405-ENG-48

The Lawrence Livermore Laboratory (LLL), as part of the Nevada Nuclear Waste Storage Investigations (NNWSI) program, is carrying out in situ rock mechanics testing in the Climax granitic stock at the Nevada Test Site (NTS). This summary addresses only those field data taken to date that address thermomechanical modeling for a hard-rock repository. The results to be discussed include thermal measurements in a heater test that was conducted from October 1977 through July 1978, and stress and displacement measurements made during and after excavation of the canister storage drift for the Spent Fuel Test (SFT) in the Climax granite. Associated laboratory and field measurements are summarized. The rock temperature for a given applied heat load at a point in time and space can be adequately modeled with simple analytic calculations involving superposition and integration of numerous point source solutions. The input, for locations beyond about a meter from the source, can be a constant thermal conductivity and diffusivity. The value of thermal conductivity required to match the field data is as much as 25% different from laboratory-measured values. Therefore, unless we come to understand the mechanisms for this difference, a simple in situ test will be required to obtain a value for final repository design. Some sensitivity calculations have shown that the temperature field is about ten times more sensitive to conductivity than to diffusivity under the test conditions. The orthogonal array was designed to detect anisotropy. After considering all error sources, anisotropic efforts in the thermal field were less than 5 to 10%. (ERA citation 05:009723)

UCRL-15143 PC **A08**/MF **A01**
Decisions and Designs, Inc., McLean, VA.
Radiological Performance Objectives for Radioactive Waste Derived from Public Values. Final Report PR 78-20-80R.
S. R. Watson, V. N. Campbell, K. P. Kuskey, and P. H. Feuerwerger. May 79, 174p
Contract W-7405-ENG-48

The study explored the feasibility of incorporating public values into technical guidelines for nuclear-

waste management: to this end (1) a set of value judgments to be elicited from the public was developed; (2) mathematical models for translating those judgments into guidelines were constructed; (3) fifty-eight people were selected and interviewed; and (4) the results of the interviews were used with the mathematical models to demonstrate the calculation of guidelines. Our study tentatively shows that a decision-analytic approach to risk evaluation is a feasible way to incorporate public judgments as to the relative significance of the various possible consequences of a waste repository. An important outcome of the study, however, was to encounter and identify in practice several problems to resolve in the use of public values to develop guidelines. The major problems fall under six headings: (1) definition of the set of values to assess; (2) methodology of assessment; (3) ability of public to quantitate their judgments; (4) social-choice theory behind mathematical models; (5) compatibility of models and data; and (6) technical objectives. (ERA citation 05:008146)

UCRL-15150 PC **A06**/MF **A01**
Analytic Sciences Corp., Reading, MA.
NUTRAN: A Computer Model of Long-Term Hazards from Waste Repositories.
B. Ross, C. M. Koplik, M. S. Giuffre, S. P. Hodgin, and J. J. Duffy. 7 Dec 79, 118p TR-1797-7
Contract W-7405-ENG-48

The NUTRAN package of computer programs calculates doses to humans from radioactivity carried out of deep geologic waste repositories by groundwater. It consists of four codes: ORIGEN (developed by Oak Ridge National Laboratory), which treats the formation and decay of radionuclides, WASTE, which computes the transport of radionuclides in ground water, BIODOSE, which calculates radionuclide transport in surface waters and ecosystems and human exposures, and WPPLOT, which combines the results of WASTE and BIODOSE into usefully formatted outputs. This report describes what the WASTE, BIODOSE, and WPPLOT codes do. The equations they compute are presented in detail and their meaning is explained. Auxiliary programs which facilitate input and data management operations are also described. (ERA citation 05:011374)

UCRL-15152 PC **A18**/MF **A01**
Owens (Willard) Associates, Inc., Wheat Ridge, CO.
Geoscience Parameter Data Base Handbook: Granites and Basalts.
Dec 79, 407p
Contract W-7405-ENG-48

The Department of Energy has the responsibility for selecting and constructing Federal repositories for radioactive waste. The Nuclear Regulatory Commission must license such repositories prior to construction. The basic requirement in the geologic disposal of radioactive waste is stated as: placement in a geologic host whereby the radioactive waste is not in mechanical, thermal or chemical equilibrium with the object of preventing physical or chemical migration of radionuclides into the biosphere or hydrosphere in hazardous concentration (USGS, 1977). The object of this report is to document the known geologic parameters of large granite and basalt occurrences in the coterminous United States, for future evaluation in the selection and licensing of radioactive waste repositories. The description of the characteristics of certain potential igneous hosts has been limited to existing data pertaining to the general geologic character, geomechanics, and hydrology of identified occurrences. A description of the geochemistry is the subject of a separate report. (ERA citation 05:011358)

UCRL-15163 PC **A03**/MF **A01**
New Millennium Associates, Santa Barbara, CA.
Survey of Near-Field Flow Calculations for Nuclear Waste Repositories NMA L21.
R. N. Wilson, and D. H. Holland. Nov 79, 39p
Contract W-7405-ENG-48

A survey of methods and codes which describe the flow of groundwater and the migration of radioactive waste in and about nuclear repositories was performed. A number of laboratories engaged in studies of waste migration and groundwater flow were visited in order to discuss the general problem and obtain reports of work being performed. The results of this survey are discussed. (ERA citation 05:013175)

UCRL-15166(V.2) PC **A08**/MF **A01**
Golder Associates, Inc., Kirkland, WA.
Derivation of Parameters Necessary for the Evaluation of Performance of Sites for Deep Geological Repositories with Particular Reference to Bedded Salt, Livermore, California. Volume II. Appendices.
J. P. Ashby, G. E. Rawlings, C. A. Soto, D. F. Wood, and D. W. Chorley. Dec 79, 173p
Contract W-7405-ENG-48

The method of selection of parameters to be considered in the selection of a site for underground disposal of radioactive wastes is reported in volume 1. This volume contains the appendix to that report. The topics include: specific rock mechanics tests; drilling investigation techniques and equipment; geophysical surveying; theoretical study of a well text in a nonhomogeneous aquifer; and basic statistical and probability theory that may be used in the derivation of input parameters. (ERA citation 05:011360)

UCRL-15167(V.1) PC **A04**/MF **A01**
Analytic Sciences Corp., Reading, MA.
Aspects of Nuclear Waste Management. Volume 1. Pre-Emplacement Risks.
D. A. Ensminger, and S. G. Oston. 10 Aug 79, 58p
Contract W-7405-ENG-48

Results of the previous one-dimensional thermal analysis of interim storage accidents are confirmed by more detailed two-dimensional calculations. Waste temperatures calculated for interim storage accidents are moderately sensitive to assumptions concerning canister spacing and are much less sensitive to boundary conditions at the canister top. For an individual 100 m from a transportation accident involving solidified high-level waste, the expected dose from gamma radiation is on the order of or smaller than the other possible exposures in the same accident. For the calculation of expected doses to the worst-situated individual in accidents: Expected population dose should remain the primary measure of pre-emplacement risk in order to maintain comparability of consequences of different types of accidents. (ERA citation 05:011361)

UCRL-15168 PC **A05**/MF **A01**
Analytic Sciences Corp., Reading, MA.
Pre-Sealing Risk Analysis.
D. A. Ensminger, M. E. Hough, and S. G. Oston. 7 Jan 80, 85p
Contract W-7405-ENG-48

This report describes studies of accidents involving high-level radioactive waste before sealing the waste into a repository. The report summarizes work done in this area during Fiscal Year 1978 and supplements previous work. Models of accident probability, severity, and consequences are refined and extended. (ERA citation 05:013149)

UNI-SA-77 PC **A02**/MF **A01**
UNC Nuclear Industries, Inc., Richland, WA.
Fifteen Years Experience Filtering N Reactor Gaseous Wastes.
K. L. Fowler. 14 Jan 80, 19p CONF-800211-1
Contract EY-76-C-06-1857
International symposium on management of gaseous wastes from nuclear facilities, Vienna, Austria, 18 Feb 1980.

The N Reactor exhaust gas filtering system consists of roughing filters, particulate filters, and charcoal filters, in that order. The basic particulate and charcoal filters consist of 0.46 m exp 3 /s, 60 cm x 60 cm x 30 cm filter canisters installed four canisters wide by ten canisters high in removable filter frames. The roughing filter canisters are about twice as wide and high as the other canisters but fit into similar frames of the same size. There are two side by side frames of each type of filter in each cell for a total design flow of 37 m exp 3 /s. The reactor and primary pipe space air has two cells for normal operation and one cell reserved for the accident case. One cell without roughing filters is used for the first buffer zone air around the reactor. (ERA citation 05:013599)

USGS-1543-4 PC **A02**/MF **A01**
Geological Survey, Denver, CO.
Geohydrology of Hole UE-17A, Syncline Ridge Area, Nevada Test Site.
J. E. Weir, Jr., and J. N. Hodson. Dec 79, 23p
Contract EW-78-I-08-1543

Hole UE-17a was drilled as part of a study to evaluate the suitability of Unit J of the Eleana Formation of Mississippian age as a medium for storage of nuclear wastes. The 1214-foot (370-meter) hole penetrated alluvium of Quaternary age, a thrust plate of the Tippipah Limestone of Pennsylvania and Permian age, and 668 feet (204 meters) of the Eleana Formation. A small amount of groundwater occurs in fractured quartzites and limestones of the Eleana Formation; jetting produced only 20 gallons per minute (1.3 liters per second) from the completed hole. Approximate transmissivity, calculated from jetting test results, is 1.2 feet squared per day (0.11 meters squared per day). The hydraulic head has almost steadily declined in the hole since September 29, 1976, a few days after the hole was completed. Water from the Eleana Formation is a sodium bicarbonate and sodium sulfate type. (ERA citation 05:011362)

Y/OWI/SUB-78/22340/4 PC **A03**/MF **A01**
Science Applications, Inc., Oak Ridge, TN.
Executive-Style Briefings on Selected Repository Design Issues.
2 Jun 78, 45p
Contract W-7405-ENG-26

This document is a collection of executive-style briefings on selected repository design issues. Most of the briefings discuss differences between the US repository design bases presented in US Working Drafts on Repository Physical Descriptions in a Salt Formation, prepared in support of INFCE discussions of May 1978 and the FRG-Netherlands design bases, presented in Design Study of a Radioactive Waste Repository to be Mined in a Medium-Size Salt Dome by Hamstra and Velzeboer, Netherlands Energy Research Foundation, January 1978. Advantages and disadvantages of the two sets of design bases are discussed, and the impacts of adopting either of these bases on the other's programs and positions are identified. (ERA citation 05:009724)

Y/OWI/TM-37 PC **A03**/MF **A01**
Union Carbide Corp., Oak Ridge, TN. Office of Waste Isolation.
Areal Thermal Loading Recommendations for Nuclear Waste Repositories in Salt.
J. E. Russell. Jun 79, 50p
Contract W-7405-ENG-26

This document gives a wider understanding of the history of the recommended thermal loadings in salt for both high-level waste (HLW) from fresh UO sub 2 -fueled, light-water reactors (LWR) with no recycle and spent unreprocessed fuel (SURF) from LWRs. Aspects of the current recommendations that need further study are identified. Finally, an interim set of design thermal-loading recommendations are given that have a common rationale of satisfying performance limits within our current state of knowledge. These recommendations are made on a generic rather than a site-specific basis. 11 figures, 5 tables. (ERA citation 05:013176)

18H. Radioactivity

AD-A082 639/6 PC **A02**/MF **A01**
Army Test and Evaluation Command Aberdeen Proving Ground MD
US Army Test and Evaluation Command, Test Operations Procedure, Gamma Ray Source Calibration.
Final rept.
28 Mar 80, 9p Rept no. TOP-6-2-552
See also AD-728 455 and AD-871 790.

This TOP provides techniques to perform periodic calibration of gamma ray sources used as secondary standards. The personnel must be trained and experienced in Radiac calibration equipment and

for that reason the procedures are not step-by-step but are planned to be interpreted by the operator in each instance. (Author)

AECL-6319 PC **A03**/MF **A01**
Atomic Energy of Canada Ltd., Pinawa (Manitoba). Whiteshell Nuclear Research Establishment.
Bibliography of AECL Publications on Environmental Research.
N. J. Hawley. Dec 78, 40p
U.S. Sales Only.

Publications in the open literature on environmental research performed by AECL personnel are listed chronologically with the first entry dated 1951. It is intended that the bibliography should be brought up to date yearly. (Atomindex citation 10:462059)

AEEW-M-1628 PC **A03**/MF **A01**
UKAEA Atomic Energy Establishment, Winfrith (England).
Activity and Size Distributions of Aerosols in the Laboratory for Experimental Fuels AEE Winfrith.
D. C. Stevens, D. C. Fraser, and T. F. Johns. Jan 79, 34p
U.S. Sales Only.

Measurements have been made of the particle activity and particle size distributions of aerosols encountered in a building in which uranium and plutonium oxides are fabricated into experimental fuel elements in freestanding glove boxes. The particle size distribution has been determined by examination of the filter papers of personal air samplers and installed air samplers operating on occasions on which such aerosols were accidentally released into the building due to damaged gloves or posting ports. When large numbers of particles are released, the aerosol is characterised by a log-normal particle-size distribution; the respirable fraction is rather variable, but it would appear that the amount retained in the lung is unlikely to differ from the amount deduced on the basis of the ICRP lung model by more than a factor of four. In many of the less severe incidents, the activity collected on the filter paper was almost entirely due to a very small number of particles. (Atomindex citation 10:463385)

COO-10041-1 PC **A02**/MF **A01**
Lamont-Doherty Geological Observatory, Palisades, NY.
Coral Growth Rings and the Temporal History of Nuclear exp 14 C/C and exp 90 Sr/Sr in the Surface Ocean. Progress Report, February 1, 1979-January 31, 1980.
W. S. Broecker, R. G. Fairbanks, and T. H. Peng. Sep 79, 12p
Contract AC02-79EV10041

In addition to sampling the 13 Pacific sites, we have analyzed one coral sample from Bermuda for exp 14 C and exp 90 Sr for the period 1950 to 1973 at 2-year intervals. The high precision exp 90 Sr record from our Bermuda coral shows excellent agreement with historical measurements of exp 90 Sr in surface seawater between 30 to 40 exp 0 N lat. Therefore, with a high degree of confidence, we can proceed to reconstruct the temporal history of exp 90 Sr in other regions of the world's ocean where we have few or no historical measurements of exp 90 Sr in surface water. (ERA citation 05:010593)

DP-1543 PC **A03**/MF **A01**
Du Pont de Nemours (E.I.) and Co., Aiken, SC. Savannah River Lab.
Calculation of Particulate Dispersion in a Design-Basis Tornadic Storm from the General Electric Vallecitos Nuclear Center, Vallecitos, California.
D. W. Pepper. Nov 79, 28p
Contract EY-76-C-09-0001

A three-dimensional numerical model is used to calculate ground-level air concentration and deposition (due to precipitation scavenging) after a hypothetical tornado strike at the General Electric Vallecitos Nuclear Center at Vallecitos, California. Plutonium particles less than 20 mu m in diameter are assumed to be lifted into the tornadic storm cell by the vortex. The rotational characteristics of the tornadic storm are embedded within the larger mesoscale flow of the storm system. The design-basis translational wind values are based on probabilities associated with existing records of tornado strikes in the vicinity of the plant site. Turbulence exchange coefficients are based on empirical values deduced from experimental data in severe storms and from theoretical assumptions obtained from the literature. The method of moments is used to incorporate subgrid-scale resolution of the concentration within a grid cell volume. This method is a quasi-Lagrangian scheme which minimizes numerical error associated with advection. In all case studies, the effects of updrafts and downdrafts, coupled with scavenging of the particulates by precipitation, account for most of the material being deposited within 20 to 45 km downwind of the plant site. Ground-level isopleths in the x-y plane show that most of the material is deposited behind and slightly to the left of the centerline trajectory of the storm. Approximately 5% of the material is dispersed into the stratosphere and anvil section of the storm. (ERA citation 05:012475)

DP-1544 PC **A03**/MF **A01**
Du Pont de Nemours (E.I.) and Co., Aiken, SC. Savannah River Lab.
Calculation of Particulate Dispersion in a Design-Basis Tornadic Storm from the Exxon Nuclear Company, Richland, Washington.
D. W. Pepper. Jul 78, 27p
Contract EY-76-C-09-0001

A three-dimensional numerical model is used to calculate ground-level air concentration and deposition (due to precipitation scavenging) after a hypothetical tornado strike at the Exxon Nuclear Company at Richland, Washington. Plutonium particles less than 20 mu m in diameter are assumed to be lifted into the tornadic storm cell by the vortex. The rotational characteristics of the tornadic storm are embedded within the larger mesoscale flow of the storm system. The design-basis translational wind values are based on probabilities associated with existing records of tornado strikes in the vicinity of the plant site. Turbulence exchange coefficients are based on empirical values deduced from experimental data in severe storms and from theoretical assumptions obtained from the literature. The method of moments is used to incorporate subgrid-scale resolution of the concentration within a grid cell volume. This method is a quasi-Lagrangian scheme which minimizes numerical error associated with advection. In all case studies, the effects of updrafts and downdrafts, coupled with scavenging of the particulates by precipitation, account for most of the material being deposited within 20 to 45 km downwind of the plant site. Ground-level isopleths in the x-y plane show that most of the material is deposited behind and slightly to the left of the centerline trajectory of the storm. Approximately 5% of the material is dispersed into the stratosphere and anvil section of the storm. (ERA citation 05:012476)

EGG-1183-1686 PC **A02**/MF **A01**
EG and G Idaho, Inc., Idaho Falls.
Aerial Radiological Survey of US Department of Energy Sites in Ames, Iowa. Date of Survey: May 1977.
Jul 79, 14p
Contract EY-76-C-08-1183

An aerial radiological survey to measure terrestrial gamma radiation was carried out over five areas totaling 10 km exp 2 within the town of Ames, Iowa. Gamma ray data were measured over Ames Laboratory, several sections of downtown Ames, and the surrounding area. This was accomplished by flying parallel east-west lines 61 m apart. Processed data indicated that three areas showed increased activity levels of at least twice average background: the reactor, the waste treatment area, and a small area near the airport runway. (ERA citation 05:012507)

EGG-1183-1721 PC **A02**/MF **A01**
EG and G Idaho, Inc., Idaho Falls.
Aerial Radiological Survey of the Area Surrounding the Mallinckrodt Nuclear Maryland Heights Facility and Two Additional Sites, St. Louis, Missouri. Date of Survey: October 1977.
Sep 79, 22p
Contract EY-76-C-08-1183

An aerial radiological survey to measure terrestrial gamma radiation was carried out over the Mallinckrodt Nuclear Maryland Heights Facility during October 1977. At the same time the following properties were also surveyed: a parcel near 9200 West Latty Avenue, which included a portion of St. Louis International Airport; and land used by West Lake Landfill, Inc., which is 8 km northwest of the airport. Gamma ray data were collected by flying parallel lines 60 m apart. The total area surveyed over the three sites was 7.4 km exp 2 . Processed data indicated that detected radioisotopes and their associated gamma ray exposure rates were consistent with those expected from normal background emitters, except at certain locations described in this report. Average exposure rates 1 m above the ground, as calculated from aerial data, are presented in the form of an isopleth map. No ground sample data were taken at the time of the aerial survey. (ERA citation 05:012508)

EGG-1183-1734 PC **A02**/MF **A01**
EG and G, Inc., Las Vegas, NV. Energy Measurements Group.
Aerial Radiological Survey of the Area Surrounding the Joseph M. Farley Nuclear Plant, Dothan, Alabama, Date of Survey: March 1977.
L. K. Hilton. Nov 78, 14p
Contract EY-76-C-08-1183

An airborne radiological survey of a 2146 km exp 2 area surrounding the Joseph M. Farley Nuclear Plant was made 19-23 March 1977. Detected radioisotopes, and their associated gamma ray exposure rates, were consistent with that expected from the normal background emitters. Count rates observed at 152 m altitude are converted to equivalent exposure rates at 1 m above the ground, and are presented in the form of an isopleth map. Exposure rates measured with small portable instruments and soil sample analysis showed agreement with the airborne data. (ERA citation 05:012500)

EGG-1183-1739 PC **A02**/MF **A01**
EG and G, Inc., Las Vegas, NV. Energy Measurements Group.
Aerial Radiological Survey of the United States Department of Energy's Battelle Nuclear Science Facility, West Jefferson, Ohio, Date of Survey: May 1977.
E. L. Feimster. May 79, 13p
Contract EY-76-C-08-1183

An aerial radiological survey to measure terrestrial gamma radiation was carried out over the United States Department of Energy's Battelle Nuclear Science Facility located in West Jefferson, Ohio. Gamma ray data were collected over a 5.5 km exp 2 area centered on the facility by flying east-west lines spaced 61 m apart. Processed data indicated that on-site radioactivity was primarily due to radionuclides currently being processed due to the hot lab operations. Off-site data showed the radioactivity to be due to naturally occurring background radiation consistent with variations due to geologic base terrain and land use of similar areas. (ERA citation 05:012501)

EGG-1183-2149 PC **A04**/MF **A04**
EG and G, Inc., Santa Barbara, CA.
ARMS New Hampshire Area Special Aeroradioactivity Survey.
R. R. Reskovac, and A. S. Trundle, III. Jun 67, 54p
Contract EY-76-C-08-1183

EG and G measured the radioactivity in the White Mountains area of New Hampshire, using the Aerial Radiation Measurements System (ARMS). Particular attention was give to the areas containing formations of Conway granite. Gross-count and spectral measurements were made, and these data are presented in relation to the known geology of the area. Various other methods of data collection were employed and are briefly evaluated in this report. (ERA citation 05:012478)

EML-362 PC **A02**/MF **A01**
Department of Energy, New York. Environmental Measurements Lab.
Natural Radiation Background of Utah: Preliminary Report on Radionuclides in Soils in Populated Areas.
H. L. Beck. Aug 79, 21p

External radiation exposure rates were measured at over 150 sites in 56 cities and towns in Utah using in situ field gamma-ray spectrometric and high pressure ionization chamber systems. These measurements are part of a more extensive radiological survey of Utah by this Laboratory to determine residual levels of fission products and transuranic nuclides in soils as a result of nuclear weapons tests at the Nevada Test Site (NTS) during 1950-58. Open field exposure rates from natural terrestrial gamma-ray sources are fairly uniform around the state and are comparable to the mean exposure rate for the US. However, exposure from cosmic-ray secondaries in Utah is about 50% higher than for most other US residents, due to the higher altitude. No significant difference was found in the population-weighted mean annual exposure from terrestrial gamma radiation to persons living in the part of the state that is closest to the NTS relative to those living in more distant counties, although the former receive, on average, a slightly greater cosmic-ray exposure. (ERA citation 05:010572)

EML-366 PC **A03**/MF **A01**
Department of Energy, New York. Environmental Measurements Lab.
Radioanalytical Laboratory Exercise.
H. L Volchok, and M. Feiner. 2 Oct 79, 45p

Fifteen institutions participated in a laboratory intercomparison involving seven natural'matrix samples and six radionuclides. The exercise was organized and coordinated by the Environmental Measurements Laboratory. In some of the samples the radionuclide concentrations were known quite well and in those it was observed that in spite of differences among laboratories, the median of all reported values rather accurately represents the true concentration. (ERA citation 05:014222)

FOA-C-40089 PC **A06**/MF **A01**
Foersvarets Forskningsanstalt, Stockholm (Sweden).
Particulate Radioactivity, Mainly from Nuclear Explosions, in Air and Precipitation in Sweden Mid-Year 1975 to Mid-Year 1977.
L. E. de Geer, R. Arntsing, I. Vintersved, J. Sisefsky, and S. Jakobsson. Nov 78, 113p
U.S. Sales Only.

The National Defence Research Institute runs a network for continuous sampling of radioactivity in ground level air and in precipitation in Sweden and performs high altitude air sampling by means of aircraft from the Royal Swedish Air Force. The present report describes the revised surveillance program in effect since January 1 1976, discusses the preparation, measuring and analysis procedures and gives the results of most measurements made on samples collected between mid-year 1975 and mid-year 1977. This includes results and discussions on four-week samples of ground level air and deposition collected at seven locations in Sweden and weekly samples of ground level air collected at Kiruna, Grindsjoen (near Stockholm) and Ljungbyhed. All high-altitude samples collected during the two years have been analysed and reported on, even from times when no fresh activity was detected. The period covers three atmospheric nuclear explosion tests performed by The People's Republic of China, a low-yield test on January 23 1976, a medium range yield test on September 26 1976 and a high-yield test on November 17 1976. These three tests are discussed in terms of such factors as the atmospheric behaviour of the debris cloud, fractionation and particle properties of the debris and of neutron activation products detected. One strong sample collected nine days after the November 17 1976 thermonuclear explosion was measured extensively during more than a year and was used to construct a mass-yield curve which is compared with mass-yield curves for different monoenergetic neutrons incident on exp 238 U. On some occasions activities were detected that did not derive from any known nuclear explosions test. This is discussed in the last chapter, parts of which have been published elsewhere but which is included here to give a full account of the two years covered by this report. (Atomindex citation 10:463013)

HEDL-TME-79-36 PC **E04**/MF **E04**
Hanford Engineering Development Lab., Richland, WA.
AFCT/TFCT Environmental Assessment Program: Waterborne Radionuclide Concentration and Dose Calculations for the Southeast Study Basin.
J. C. Sonnichsen, Jr., J. F. Fletcher, H. A. Carlson, P. D. Charles, and L. M. Uhler. Nov 79, 141p
Contract EY-76-C-14-2170

In support of the Alternate Fuel Cycle Technology - Thorium Fuel Cycle Technology (AFCT/TFCT) Environmental Assessment Program, a methodology was developed and applied for purposes of estimating the radiological impact associated with the transport of waterborne radionuclides. Radionuclide concentration and ingestion dose calculations were performed for a hypothetical source located on the Savannah River Project. A study area of approximately 52,000 square miles was divided into subareas using the eight-digit water resources cataloging unit. A hydrologic model of five major river drainage basins (Santee, Edisto, Savannah, Ogeechee, and Altamaha) was prepared. One-and fifty-year individual and population dose calculations were performed. (ERA citation 05:011368)

IS-4716 PC **A03**/MF **A01**
Ames Lab., IA.
Multilaboratory Analytical Quality Control for the Hydrogeochemical and Stream Sediment Reconnaissance. Quality Control Report, September 1979.
A. P. D'Silva, M. A. Floyd, and W. J. Haas, Jr. Oct 79, 30p
Contract W-7405-ENG-82

For the month of September 1979, Ames Laboratory received the following number of results: from Los Alamos Scientific Laboratory, Water A5-0.98 ppb U (4 F) and Water B5-9.00 ppb U (4 F), and from the Oak Ridge Gaseous Diffusion Plant, Sediment R3-5 ppm U (11 F, 7 DNC) and Sediment S3-10 ppm U (7 F, 5 DNC). F indicates fluorometric analyses and DNC indicates delayed neutron counting. (ERA citation 05:010414)

JEN-423 PC **A03**/MF **A01**
Junta de Energia Nuclear, Madrid (Spain).
REY: A Computer Code for the Determination of the Radionuclides Activities from the gamma-Ray Spectrum Data.
J. Palomares, A. Perez, and A. Travesi. 1978, 27p
In Spanish.
U.S. Sales Only.

The Fortran IV computer Code, REY (REsolution and Identification), has been developed for the automatic resolution of the gamma-ray spectra from high resolution Ge-Li detectors. The Code searches the full energy peaks in the spectra background as the base line under the peak and calculates the energy of the statistically significant peaks. Also the Code assigns each peak to the most probable isotope and makes a selection of all the possible radioisotopes of the spectra, according the relative intensities of all the peaks in the whole spectra. Finally, it obtains the activities, in microcuries of each isotope, according the geometry used in the measurement. Although the Code is a general purpose one, the actual library of nuclear data is adapted for the analysis of liquid effluents from nuclear power plants. A computer with a 16 core memory and a hard disk are sufficient for this code. (Atomindex citation 10:462050)

ORNL/TM-6751 PC **A04**/MF **A01**
Oak Ridge National Lab., TN.
Estimation of North American Population Doses Resulting from Radon-222 Release in Western United States: Methodology.
D. E. Fields, C. C. Travis, A. P. Watson, and L. M. McDowell-Boyer. Dec 79, 57p
Contract W-7405-ENG-26

The report represents a compilation of computer codes used to estimate potential human exposures and inhalation doses due to unit releases of exp 222 Rn from uranium milling sites in western United States. The populations considered for potential exposure to risk from exp 222 Rn and associated daughters are the inhabitants of North America between 20 exp 0 and 60 exp 0 North latitude. The primary function of these codes is to integrate spatially atmospheric radionuclide concentrations with current population data for the geographic area under consideration. It is expected that these codes will be of assistance to anyone interested in assessing nuclear or nonnuclear population exposures over large geographic areas. (ERA citation 05:012480)

PNL-TR-376 PC **A02**/MF **A01**
Transuranic Elements in Nature: Plutonium around Us.
C. Keller, and I. B. Alleluia. 1979, 25p
Contract EY-76-C-06-1830
A, Bild Wiss. n1 P56-65 1979.

The potential hazards associated with the presence in the environment of plutonium is discussed. The origins and distribution of plutonium are reviewed. Two accidents involving the release of plutonium and subsequent clean-up efforts are described. It is concluded that artificially produced plutonium does not, as of yet, pose a significant health hazard. (ERA citation 05:014223)

PNL-2947 PC **A05**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Radiation Characterization, and Exposure Rate Measurements from Cartridge, 105-mm, APFSDS-T, XM774.
W. T. Bartlett, R. L. Gilchrist, G. W. R. Endres, and J. L. Baer. Nov 79, 87p
Contract EY-76-C-06-1830

In response to a recommendation from the Joint Technical Coordinating Group for Munitions Effectiveness, Working Group on Depleted Uranium Munitions, the Department of the Army contracted with Pacific Northwest Laboratory (PNL) to investigate the health physics problems associated with the assembly, storage, and use of 105-mm, APFSDS-T, XM774 ammunition. Each round of this ammunition contains a penetrator rod of 3.4 kg of depleted uranium (DU), which is classified as a radioactive source material. The study carried out by PNL included laboratory and field analyses and an assessment of current health physics practices. The data sought included: the characteristics of radiation emitted from a penetrator and an assembled projectile; a comparison of film and thermoluminescent dosimeters; a comparison of radiation detection instruments; and the exposure rates from a single XM774 round, a loaded storage container, a standard pallet, and a loaded tank. (ERA citation 05:012503)

SAND-79-1727 PC **A03**/MF **A01**
Sandia Labs., Albuquerque, NM.
Beneficial Uses Program. Progress Report, Period Ending June 30, 1979.
Oct 79, 49p
Contract EY-76-C-04-0789

Progress in research on the irradiation of sewage sludge, the potential use of dried sewage sludge as animal feed or soil conditioners, the inactivation of rotavirus in sewage sludge, fruit fly control by the irradiation of citrus fruits, and the production of exp 137 Cs source pellets is reported. (ERA citation 05:009740)

SRD-R-120 PC **A05**/MF **A01**
UKAEA Risley Nuclear Power Development Establishment, Culcheth (England). Safety and Reliability Directorate Culcheth.
Guide to TIRION 4 - a Computer Code for Calculating the Consequences of Releasing Radioactive Material to the Atmosphere.
L. S. Fryer. Dec 78, 77p
U.S. Sales Only.

TIRION 4 is the most recent program in a series designed to calculate the consequences of releasing radioactive material to the atmosphere. A brief description of the models used in the program and full details of the various control cards necessary to run TIRION 4 are given. (Atomindex citation 10:463365)

18I. Reactor Engineering and Operation

AE-TPM-BL-121 PC **A02**/MF **A01**
Aktiebolaget Atomenergi, Studsvik (Sweden).

Fission Product Migration in Intact Fuel Rods S176 Experiments 1-5: Estimation of Fuel Temperatures During Irradiation.
W. H. Blackadder, J. Kilter, and K. Malen. Nov 77, 23p
U.S. Sales Only.

This work is part of a project, the aim of which is to provide information on the distribution of fission products in intact irradiated fuel rods, both within the UO sub 2 fuel and on the inside of the zircaloy clad. Fuel rods, previously irradiated to appreciable burnups in the Aagesta R3 reactor, after cooling, are re-irradiated in the Studsvik R2 test reactor for short periods to build up significant inventories of short-lived fission products of interest. The irradiation conditions are well defined. The parameter of greatest importance for the migration is the temperature. For this reason temperature distributions have been calculated using a computer code. Grain growth measurements have also been made. The grain growth data typically yield a 5-10 % higher temperature than the calculations with a scatter of the same amount (5-10 %) about the mean. (Atomindex citation 10:461734)

AE-TPM-BL-124 PC **A03**/MF **A01**
Aktiebolaget Atomenergi, Studsvik (Sweden).
Fission Product Migration in Intact Fuel Rods S176 Experiments 1-5: Metallography Results.
C. Wikstroem, W. H. Blackadder, and K. Malen. Nov 77, 33p
U.S. Sales Only.

This work is part of a project, the aim of which is to provide information on the distribution of fission products in intact irradiated fuel rods, both within the UO sub 2 fuel and on the inside of the zircaloy clad. Fuel rods, previously irradiated to appreciable burnups in the Aagesta R3 reactor, after cooling, are re-irradiated in the Studsvik R2 test reactor for short periods to build up significant inventories of short-lived fission products of interest. The irradiation conditions are well defined. In this report the results from the ceramographic analyses of the fuel rods are presented together with the beta autoradiography results. (Atomindex citation 10:461740)

AECL-5718 PC **A03**/MF **A01**
Atomic Energy of Canada Ltd., Chalk River (Ontario). Chalk River Nuclear Labs.
Responses of Platinum, Vanadium and Cobalt Self-Powered Flux Detectors Near Simulated Booster Rods in a ZED-2 Mockup of a Bruce Reactor Core.
P. M. French, R. B. Shields, and J. C. Kroon. Feb 78, 33p
U.S. Sales Only.

The static responses of Pt, V and Co self-powered detectors have been compared with copper-foil neutron activation profiles in reference and perturbed Bruce reactor core mockups assembled in the ZED-2 test reactor at Chalk River Nuclear Laboratories. The results indicate that the normalized response of each self-powered detector is an accurate measure of the thermal-neutron flux at locations greater than one lattice pitch from either a booster rod or the core boundary. They indicate that, in the Bruce booster/detector configuration, the normalized static Pt response overestimates the neutron flux by less than 3.5% upon full booster-rod insertion. (Atomindex citation 09:412017)

AECL-5997 PC **A02**/MF **A01**
Atomic Energy of Canada Ltd., Pinawa, (Manitoba). Whiteshell Nuclear Research Establishment.
Development of an Automated System for CANDU Secondary Coolant Circuit Chemistry Control. Program Summary and Conclusions.
J. R. Dean, and R. B. Stewart. Apr 78, 25p
U.S. Sales Only.

This report is a summary of work done to develop a means for automated control of the secondary coolant chemistry of CANDU 600 MW(e) power reactors using on-line analyzers and a minicomputer. The development work was carried out in cooperation with Saskatchewan Power Corporation at Estevan. Results and conclusions of the program are included, as are recommendations for a prototype installation in a domestic CANDU 600 MW steam generator. (Atomindex citation 09:411887)

AECL-6093 PC **A04**/MF **A01**
Atomic Energy of Canada Ltd., Chalk River (Ontario). Chalk River Nuclear Labs.
Inertial Analysis of Hydrodynamic Oscillations in the Gentilly-1 Steam Mains.
E. O. Moeck, and P. Y. Wong. May 78, 71p
U.S. Sales Only.

It has been proposed that the Gentilly-1 (G-1) Generating Station be modified to supply process steam to the La Prade Heavy Water Plant (LHWP), but that the generating capability of the station be retained, varying from house load (approxmately 17 MW(e) to the design value (250 MW(e), depending on the steam requirement of the heavy-water plant. To achieve this versatility, four reboilers would be connected to the existing steam-mains system, and a new pressure controller would be required. An inertial analysis of the hydrodynamic behaviour of both the existing and proposed G-1 steam-mains networks is described. In general, the hydrodynamic behaviour of the proposed steam-mains network would be about the same as that of the existing network, during disturbances of low frequency (< 1 Hz), at nominal operating conditions. (Atomindex citation 09:411894)

AECL-6171 PC **A02**/MF **A01**
Atomic Energy of Canada Ltd., Chalk River (Ontario). Chalk River Nuclear Labs.
Response Characteristics of Self-Powered Flux Detectors in CANDU Reactors.
C. J. Allan. May 78, 13p CONF-780469-2
IAEA symposium on nuclear power plant control and instrumentation, Cannes, France, 24 Apr 1978.
U.S. Sales Only.

As part of the development of a new flux-detector assembly for future CANDU reactors, the sensitivities of a variety of vanadium, cobalt and platinum self-powered detectors have been determined in a simulated CANDU core installed in the ZED-2 test reactor at CRNL. While the vanadium and cobalt detectors had solid emitters, the platinum detectors were of two types, having either solid platinum emitters, or emitters consisting of a platinum sheath over an Inconel core. Almost all of the signal from the cobalt and vanadium detectors is due to neutron events in the emitters. For these detectors the total sensitivities per unit length were measured. For the platinum detectors, reactor gamma -rays and neutrons both contribute appreciably to the output signal, and in addition to the total sensitivity, the individual neutron and gamma -ray sensitivities for these detectors were detected. It was found that the detector sensitivities depend primarily on emitter diameter and that the observed variations can be fitted by means of power laws. (Atomindex citation 09:411990)

AECL-6174 PC **A03**/MF **A01**
Atomic Energy of Canada Ltd., Sheridan Park (Ontario). Power Projects.
Analysis of Flux Peaking at Nuclear Fuel Bundle Ends Using PEAKAN.
M. H. M. Roshd, and H. C. Chow. Apr 78, 30p
U.S. Sales Only.

PEAKAN, a two-dimensional code in R-Z geometry based on solving the integral transport equation with pre-calculated collision probabilities, has been developed and tested. The limitations of the conventional collision probability method have been overcome by the "block method", which made possible a large increase in the size of problems to be solved as well as a significant reduction in computation time. PEAKAN has been used to analyze several experiments done in the ZED-2 reactor to measure flux peaking at the end of CANDU fuel bundles in contact either with other bundles or with water only. The peaking factors in this study ranged from 1.14 to 1.9, and the agreement between calculations and measurements was within experimental errors. This shows that this code can be used as a tool for fuel design purposes and for the calculation of flux peaking in all cases where the R-Z geometry is applicable. (Atomindex citation 09:411897)

AECL-6176 PC **A03**/MF **A01**
Atomic Energy of Canada Ltd., Chalk River (Ontario). Chalk River Nuclear Labs.
Acoustic Analysis of Hydrodynamic Oscillations in the Gentilly-1 Steam Mains.
W. N. Selander, and P. Y. Wong. Nov 78, 43p
U.S. Sales Only.

A small amplitude (acoustic) wave equation is used to investigate pressure oscillations in the Gentilly-1 primary steam network, in both its existing form, and with the proposed modifications for LaPrade Heavy Water Plant. The equations are solved in two basic approximations. In the first approximation, damping and bulk steam motion are ignored and the resonant frequencies and mode shapes of the network are evaluated. In the second approximation damping and flow effects are included, and the frequency response of the network to a specific disturbance is found. The predicted results show good agreement with observations on the existing system, which gives some confidence in the predictions for the modified network. (Atomindex citation 10:461739)

AECL-6182 PC **A03**/MF **A01**
Atomic Energy of Canada Ltd., Chalk River (Ontario). Chalk River Nuclear Labs.
Potential of Axial Fuel Management Strategies in Thorium-Fuelled CANDU'S.
M. S. Milgram. Jun 78, 29p
U.S. Sales Only.

Three axial fuel management strategies are compared for use in a CANDU-PHW reactor operating on a self-sufficient, equilibrium thorium cycle. Two of these strategies are familiar ones for uranium reactors, and the third seeks to take advantage of the nuclear characteristics of the Th exp 232 implies U exp 233 transmutation chain to improve the economics of the fuel cycle by periodically removing the fuel from the reactor. This results in an approximately 50% increase in burnup and an approximately 15% decrease in heavy element fuel inventory at a channel power of 6 MW, relative to the other strategies. (Atomindex citation 09:411893)

AECL-6184 PC **A02**/MF **A01**
Atomic Energy of Canada Ltd., Chalk River (Ontario). Chalk River Nuclear Labs.
Vibration of Heat Exchange Components in Liquid and Two-Phase Cross-Flow.
M. J. Pettigrew, and D. J. Gorman. May 78, 20p CONF-780589-2
Conference on vibration in nuclear plant, Keswick, UK, 9 May 1978.
U.S. Sales Only.

Heat exchange components must be analysed at the design stage to avoid flow-induced vibration problems. This paper presents information required to formulate flow-induced vibration excitation mechanisms in liquid and two-phase cross-flow. Three basic excitation mechanisms are considered, namely: 1) fluidelastic instability, 2) periodic wake shedding, and 3) response to random flow turbulence. The vibration excitation information is deduced from vibration response data for various types of tube bundles. Sources of information are: 1) fundamental studies on tube bundles, 2) model testing, 3) field measurements, and 4) operating experiences. Fluidelastic instability is formulated in terms of dimensionless flow velocity and dimensionless damping; periodic wake shedding in terms of Strouhal number and lift coefficient; and random turbulence excitation in terms of statistical parameters of random forces. Guidelines are recommended for design purposes. (Atomindex citation 09:411718)

AECL-6202 PC **A02**/MF **A01**
Atomic Energy of Canada Ltd., Chalk River (Ontario). Chalk River Nuclear Labs.
Introducing Advanced Nuclear Fuel Cycles in Canada.
M. F. Duret. May 78, 24p
U.S. Sales Only.

The ability of several different advanced fuel cycles to provide energy for a range of energy growth scenarios has been examined for a few special situations of interest in Canada. Plutonium generated from the CANDU-PHW operating on natural uranium is used to initiate advanced fuel cycles in the year 2000. The four fuel cycles compared are: 1) natural uranium in the CANDU-PHW; 2) high burnup thorium cycle in the CANDU-PHW; 3) self-sufficient thorium cycle in the CANDU-PHW; 4) plutonium-uranium cycle in a fast breeder reactor. While any plutonium generated prior to the

ntroduction of the advanced fuel cycle remains, system requirements for natural uranium for each of the advanced fuel cycles are the same and are governed by the rate at which plants operating on natural uranium can be retired. When the accumulated plutonium inventory has been entirely used, natural uranium is again required to provide inventory for the advanced fuel cycle reactors. The time interval during which no uranium is required varies only from about 25 to 40 years for both thorium cycles, depending primarily on the energy growth rate. (Atomindex citation 09:411888)

AECL-6211 PC **A02/MF A01**
Atomic Energy of Canada Ltd., Chalk River (Ontario). Chalk River Nuclear Labs.
Development of Nuclear Quality High Pressure Valve Bellows in Canada.
P. Janzen, and C. J. Astill. Jun 78, 16p CONF-7806125-3
1978 annual conference of the Canadian Nuclear Association, Ottawa, Canada, 11 Jun 1978.
U.S. Sales Only.

Concurrent with the decision to use bellows stem sealed nuclear valves where feasible in commercial-scale CANDU plants, AECL undertook to develop an indigenous high pressure valve bellows technology. This program included developing the capability to fabricate improved high pressure valve bellows in conjunction with a Canadian manufacturer. The evolution of a two-stage bellows fabrication process is described which involves: (1) manufacture of discrete lengths of precision thin wall telescoping tubes - from preparation of strip blanks through edge grinding and edge forming to longitudinal welding; (2) forming of bellows from tube assemblies using a novel combination of mechanical inward forming followed by hydraulic outward forming. Bellows of Inconel 600 and Inconel 625 have been manufactured and evaluated. Test results indicate comparable to improved performance over alternative high quality bellows. (Atomindex citation 09:411892)

AECL-6212 PC **A02/MF A01**
Atomic Energy of Canada Ltd., Chalk River (Ontario). Chalk River Nuclear Labs.
Spatial Power Control in Large CANDU Reactors: The Whys and Wherefores.
F. N. McDonnell, and R. E. Green. Jun 78, 22p CONF-7806125-2
1978 annual conference of the Canadian Nuclear Association, Ottawa, Canada, 11 Jun 1978.
U.S. Sales Only.

The ratio R exp 2 /M exp 2 (reactor core area/ neutron interaction area), a measure of reactor core size, has increased by a factor of 6 as the CANDU reactor has evolved from NPD to the proposed PHW-1250 MWe design. Consequently, the various regions of the larger reactor cores are less tightly coupled. Another trend in CANDU design has been an increase in flux flattening in the reactor core, to increase the power form factor and hence power output from a given core size. This also decreases the coupling between core regions. In the early CANDU reactors (e.g. NPD, Douglas Point) little or no spatial control action was necessary. Bulk power control, based on out-of-core flux monitors, was sufficient. However, current CANDU reactors require spatial power control and use in-core flux detectors to provide the information on spatial power distribution required by the control system. In this paper we discuss the evolution of spatial power control in CANDU reactors and outline some of the methods used to assess the spatial controllability of current and future CANDUs. To illustrate the methods, reference is made to a recent assessment of the spatial controllability of a large CANDU-BLW reactor. (Atomindex citation 09:411773)

AECL-6213 PC **A02/MF A01**
Atomic Energy of Canada Ltd., Chalk River (Ontario). Chalk River Nuclear Labs.
CANDU Fuel Performance and Development.
D. G. Hardy, J. C. Wood, and A. S. Bain. Dec 78, 18p CONF-7806125-4
1978 annual conference of the Canadian Nuclear Association, Ottawa, Canada, 11 Jun 1978.
U.S. Sales Only.

The fuel defect rate in CANDU (Canada Deuterium Uranium) reactors continues to be very low, 0.06% since 1972. The power ramp defects, which constituted the majority of the early defects, have been virtually eliminated by changed fuelling schemes and through the introduction of graphite CANLUB coatings on the inside of the sheath. Laboratory and loop irradiations have demonstrated that the graphite CANLUB layers increase the tolerance to power ramps, but to obtain the maximum benefit, coating parameters such as thickness, adhesion and wear resistance must be optimized. Siloxane CANLUB coated fuel offers greater tolerance to power ramps than most graphite coatings; quality control appears simpler and no instance of localized sheath hydriding has been seen with cured and irradiated coatings. Limited testing has shown that fuel with graphite discs between fuel pellets also has high tolerance to power ramps, but it is more costly and has lower burnup. The number of defects due to faulty components has been extremely small (0.00014%), but improved quality control and welding procedures can lower this number even further. Defects from causes external to the bundle have also been very few. (Atomindex citation 10:461737)

AECL-6218 PC **A02/MF A01**
Atomic Energy of Canada Ltd., Chalk River (Ontario). Chalk River Nuclear Labs.
Outline of the Canadian R and D Program on the Behavior of CANDU Fuel Bundles in Transients.
A. W. L. Segel. Jul 78, 5p
U.S. Sales Only.

The R and D program to develop predictive models to describe the behavior and to define the performance of CANDU fuel bundles in transients is organized so as to study the separate deformation mechanisms, superimpose their effects through modelling and then verify the models with multi-effects tests. Most of the experimental program, particularly tests involving the effect of gravity, is being done in the laboratories with an electric element that closely simulates real fuel. There is no commitment to in-reactor tests of horizontal bundles in transient conditions, but appropriate facilities are being designed. (Atomindex citation 09:411898)

AECL-6403 PC **A02/MF A01**
Atomic Energy of Canada Ltd., Chalk River (Ontario). Chalk River Nuclear Labs.
Basic Concepts of a Fuel-Power Detector for Nuclear Power Reactors.
G. F. Lynch. Jan 79, 9p
U.S. Sales Only.

Fuel power is proposed as an alternative to neutron or gamma-ray flux for control and safety functions in CANDU power reactors. To satisfy in-core power monitoring requirements, a detector whose dynamic response corresponds to the heat production rate in the fuel is needed. This report explores the concept of tailoring the response characteristics of a mixed-response self-powered flux detector to match the requirements of an ideal fuel-power detector. (Atomindex citation 10:461845)

AED-Conf-77-013-188 PC **A02/MF A01**
Zentralstelle fuer Atomkernenergie-Dokumentation, Eggenstein-Leopoldshafen (Germany, F.R.).
Safety of Pressure Vessels.
R. Trumpfheller. 1977, 4p CONF-770323-9
In German.Reactor congress, Mannheim, F.R. Germany, 29 Mar 1977.
U.S. Sales Only.

Comments are made by a leading expert on the present state of knowledge concerning the safety of reactor components under pressure, a subject very much in the foreground with the public in connection with the nuclear energy discussion. (Atomindex citation 09:383030)

AED-Conf-77-329-007 PC **A02/MF A01**
Resources for the Future, Inc., Washington, DC.
Competitive Position of Nuclear Power: A Survey.
H. H. Landsberg. 1977, 25p CONF-7710166-6
Problems of nuclear energy supply - chances, risks and perspectives in a changing energy economy, Bonn-Bad Godesberg, F.R. Germany, 3 Oct 1977.
U.S. Sales Only.

Nuclear energy and coal are considered to be the two main energy sources in the USA which can replace the slowing growth and reduce the oil and gas supply. Based on the most recent analyses, it is assumed that nuclear energy has a slight competitive advantage compared to other energy sources. The two essential cost components are discussed: capital and fuel. The prospects for the capital costs for both energy systems, especially the trends which probably play a role in the price fixing of uranium and coal are investigated. Summarizing the analysis, one finds that in the long-run the uranium prices will increase faster than those of coal due to the small reserves. Even without the premature use of recycling or breeders, these trends could be slowed down for a while. On the other hand, coal winning faces serious, mostly institutional obstacles, which could cause its price to rise. The price increases for both types of energy could be of similar magnitude, however its small contribution to the overall energy costs mean that the cost increases are less of a burden in the case of nuclear energy. (Atomindex citation 09:399227)

AED-Conf-77-352-003 PC **A02/MF A01**
Zentralstelle fuer Atomkernenergie-Dokumentation, Eggenstein-Leopoldshafen (Germany, F.R.).
Evaluation of Operational Experience for the German Safety Study.
E. Lindauer. 1977, 13p CONF-771177-4
In German.GRS experts' talk on nuclear energy and risk, Muenchen, F.R. Germany, 3 Nov 1977.
U.S. Sales Only.

The proceeding of evaluation of nuclear reactor operating experiences for the German risk study is shown together with an intermediate state of the works. For foreign experiences readily available reports are used instead of own evaluations. For German reactors the available abnormal occurrences are investigated especially with regard to qualitative information. In addition, a detailed evaluation of operating data for Biblis A and B is carried out. (Atomindex citation 09:365572)

AED-Conf-77-352-004 PC **A02/MF A01**
Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.).
Accident Consequence Model of the German Safety Study.
W. Huebschmann. 1977, 23p CONF-771177-3
In German.GRS experts' talk on nuclear energy and risk, Muenchen, F.R. Germany, 3 Nov 1977.
U.S. Sales Only.

The accident consequence model essentially describes a) the diffusion in the atmosphere and deposition on the soil of radioactive material released from the reactor into the atmosphere; b) the irradiation exposure and health consequences of persons affected. It is used to calculate c) the number of persons suffering from acute or late damage, taking into account possible counteractions such as relocation or evacuation, and d) the total risk to the population from the various types of accident. The model, the underlying parameters and assumptions are described. The bone marrow dose distribution is shown for the case of late overpressure containment failure, which is discussed in the paper of Heuser/Kotthoff, combined with four typical weather conditions. The probability distribution functions for acute mortality, late incidence of cancer and genetic damage are evaluated, assuming a characteristic population distribution. The aim of these calculations is first the presentation of some results of the consequence model as an example, in second the identification of problems, which need possibly in a second phase of study to be evaluated in more detail. (Atomindex citation 09:365560)

AED-Conf-77-352-006 PC **A02/MF A01**
Muenster Univ. (Germany, F.R.).
Judicial Aspects in Risk Assessment.
R. Lukes. 1977, 19p CONF-771177-5
In German.GRS experts' talk on nuclear energy and risk, Muenchen, F.R. Germany, 3 Nov 1977.
U.S. Sales Only.

Decisions of administrative authorities concerning the permission to use fissile material contain a prognosis about the probability of damage which may be caused by using this material. The judicial criteria used in order to determine the probability of such a damage occurring can be improved by risk

analysis. This will not, of course, reduce administrative decisions to simple 'yes-or-no decisions', but the calculation of probabilities will gain more exactness. (Atomindex citation 09:365573)

AED-Conf-77-403-001 PC **A02**/MF **A01**
Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Inst. fuer Reaktorbauelemente.
Interaction of a Core Melt with Concrete.
M. Reimann, H. Holleck, A. Skokan, and D. Perinic. 1977, 24p CONF-771252-1
In German.Projekt nukleare sicherheit of the gesellschaft fuer kernforschung, Karlsruhe, F.R. Germany, 1 Dec 1977.
U.S. Sales Only.

In its fourth phase, a hypothetic core melt interacts with the concrete of the reactor foundation. This phase may last several days. Experimental laboratory investigations and theoretical models on the basis of model experiments aim at determining the time curve of the temperature of the core melt in order to quantify the processes up to the solidification of the melt and the end of concrete destroyal. Material interactions: 1) The two phases of the core melt, oxidic and metallic, remain separate for a long period of time. In dependence of the degree of oxidation of the system, the elemental distribution and, in particular, the fission products in the melt may be assessed. 2) The changes in the material values of the core melt in dependence of the temperature curve may be qualitatively assessed. 3) The solidification temperature of the oxidic phase of the core melt may be given in dependence of (UO sub 2 + ZrO sub 2) content. Thermal interactions: 1) The ratio vertical/radial erosion, which determines the cavity shape, is described in the correct order of magnitude by the extended film model. 2) The correct order of magnitude of the erosion rates is described by the concrete destruction model coupled with the film model. 3) The effects of the different concrete destruction enthalpies and concrete compositions (amount of gaseous decomposition products) may be estimated by the model calculations. (Atomindex citation 09:370605)

AED-Conf-77-498-004 PC **A03**/MF **A01**
Kraftwerk Union A.G., Erlangen (Germany, F.R.).
Shut-down Conditions, Emergency Cooling and Essential Services.
W. Belda. 1977, 47p CONF-7709147-1
Meeting on construction and operation management of a nuclear power plant, Karlsruhe, F.R. Germany, 5 Sep 1977.
U.S. Sales Only.

Included are: (1) Summary of system technology and reactor protection equipment. (2) Definitions. (3) LOCA: (a) blowdown and refilling phase; (b) jet and reaction forces; (c) flow and heat transfer behavior in the core; (d) behavior of the heater rods; (e) core melting. (4) Protection against and during LOCA: (a) general measures;(b) break of a primary coolant pipe; (c) break of a small pipe; (d) break of a secondary pipe. (Atomindex citation 09:376201)

AED-Conf-77-498-030 PC **A02**/MF **A01**
Zentralstelle fuer Atomkernenergie-Dokumentation, Eggenstein-Leopoldshafen (Germany, F.R.).
Technical Description of the CANDU Nuclear Power System.
S. D. Husseini. 1977, 13p CONF-7709147-70
Meeting on construction and operation management of a nuclear power plant, Karlsruhe, F.R. Germany, 5 Sep 1977.
U.S. Sales Only.

The lecture consists of: 1.) KANUPP description: general - Containment- Reactor Cooling System - Moderator Helium System. 2.) Operating experience: Plant Performances (as applicable to Kanupp) - Major failures of primary system - Performance of primary circulating pumps. - Heavy Water Leakage Control. - Radiation Dose Control - Inadvertant Operations. (Atomindex citation 09:389767)

AED-Conf-77-498-037 PC **A02**/MF **A01**
Zentralstelle fuer Atomkernenergie-Dokumentation, Eggenstein-Leopoldshafen (Germany, F.R.).
Need for Legislative Framework (Licensing).
H. Krech. 1977, 11p CONF-7709147-71
Meeting on construction and operation management of a nuclear power plant, Karlsruhe, F.R. Germany, 5 Sep 1977.
U.S. Sales Only.

For reasons of public acceptance the basis of a licensing system should be laid down in a law, details can be fixed in regulations below the law-level. The competence for licensing nuclear installations should be attributed to one body, which is not a the same time charged with the promotion of nuclear energy. The licensing authority has to be provided with sufficient technical advice, given by experts organized in advisory bodies. Normally a licensing procedure is split into several steps (site approval, construction permit, operation licence), each step can be subdivided. Some general aspects of licensing conditions (personal, technical and financial) as well as of the licensing procedure are outlined. The participation of the public is of particular importance but also involves most intricate problems. The paper concludes with some critical remarks on the role of administrative courts with respect to the licensing of nuclear power plants. (Atomindex citation 09:389977)

AED-Conf-77-498-065 PC **A02**/MF **A01**
Zentralstelle fuer Atomkernenergie-Dokumentation, Eggenstein-Leopoldshafen (Germany, F.R.).
Participation in Testing and Start Up Operations.
Y. S. R. Prasad. 1977, 17p CONF-7709147-72
Meeting on construction and operation management of a nuclear power plant, Karlsruhe, F.R. Germany, 5 Sep 1977.
U.S. Sales Only.

Testing and start up operations of a nuclear power plant require careful planning. A detailed program of tests and the responsibility of implementing them is discussed. Requirement of documentation covering the tests and operating procedures is explained. The performance of the system during normal and abnormal operating conditions is analysed and required are modifications carried out. Various phases of commissioning and their significance are explained. Preparation of maintenance documentation and training of operating and maintenance staff during this period are discussed. Necessity of close liaison between the regulatory body and the operating organization is explained. (Atomindex citation 09:392304)

AED-Conf-77-498-066 PC **A02**/MF **A01**
Zentralstelle fuer Atomkernenergie-Dokumentation, Eggenstein-Leopoldshafen (Germany, F.R.).
Operating Experience of Reactors Including Those in Developing Countries.
Y. S. R. Prasad. 1977, 13p CONF-7709147-73
Meeting on construction and operation management of a nuclear power plant, Karlsruhe, F.R. Germany, 5 Sep 1977.
U.S. Sales Only.

Highlights of operation between November 30, 1972 (first synchronisation) and July, 1977 are discussed. Performance of nuclear systems and equipment is analysed and the modifications carried out to improve the availability of the station are presented. Performance of conventional systems and problems on turbine generator were highlighted. The importance of heavy water management to reduce heavy water losses and the performance of on-power fuelling machines are described. The initial problems with the grid and improvements, efforts to indigenise the spares, the manrem consumption for the last four years of operation are also discussed. (Atomindex citation 09:392373)

AED-Conf-77-498-073 PC **A02**/MF **A01**
International Atomic Energy Agency, Vienna (Austria).
Regulatory Principles, Safety Policy.
G. E. Swindell. 1977, 13p CONF-7709147-7
Meeting on construction and operation management of a nuclear power plant, Karlsruhe, F.R. Germany, 5 Sep 1977.
U.S. Sales Only.

Included are discussions of objectives of radiation protection. Basic radiobiological information, current radiation protection requirements, ICRP national and international radiation protection standards. Recent extension of ICRP dose limitation system: individual dose limits for occupational and public exposure; operational radiation protection and application of optimization procedures to uncontrollable sources. (Atomindex citation 09:383022)

AED-Conf-77-528-001 PC **A02**/MF **A01**
Zentralstelle fuer Atomkernenergie-Dokumentation (ZAED), Eggenstein-Leopoldshafen (Germany, F.R.).
Advancement of the HTR Line.
G. Hirschfelder. 1977, 13p CONF-7703115-1
In German.Meeting on kraftwork Schmehausen, Schmehausen, F.R. Germany, 23 Mar 1977.
U.S. Sales Only.

The article lists the achievements so far in the field of HTR reactors. The advantages of this reactor line are described, and the problems encountered in its commercial introduction are pointed out. (Atomindex citation 09:395844)

AED-Conf-77-540-001 PC **A03**/MF **A01**
Zentralstelle fuer Atomkernenergie-Dokumentation (ZAED), Eggenstein-Leopoldshafen (Germany, F.R.).
Legal Questions Concerning the Licensing Procedure of Power Plants - Legal Questions Concerning the Immediate Enforceability.
H. J. Papier. 1977, 35p CONF-7709164-1
In German.Meeting on legal questions concerning the licensing procedure of power stations, Koeln, F.R. Germany, 29 Sep 1977.
U.S. Sales Only.

By making provisions for immediate enforceability, the FRG's law presents the executive in the field of industrial and energy-generating large-scale projects with an instrumentarium with which to react politically active and responsible to situations such as, for instance, energy shortage, implications and difficulties in the field of foreign politics, defense policies, and national economy, while at the same time the risk is taken into account that in individual cases of administrative quashing of sentences in licensing procedures malinvestments are made. Cases have grown fewer that constitutionally official bodies of State leadership, and the executive supporting them, make political decisions which they put into practice on their own responsibility. (Atomindex citation 09:396145)

AED-Conf-78-023-004 PC **A03**/MF **A01**
Zentralstelle fuer Atomkernenergie-Dokumentation, Eggenstein-Leopoldshafen (Germany, F.R.).
Safety Analyses for High-Temperature Reactors.
A. Mueller. 1978, 32p CONF-780272-3
In German.Meeting on reactor engineering and nuclear power supply, Essen, F.R. Germany, 27 Feb 1978.
U.S. Sales Only.

The safety evaluation of HTRs may be based on the three methods presented: The licensing procedure, the probabilistic risk analysis, and the damage extent analysis. Thereby all safety aspects - from normal operation to the extreme (hypothetical) accidents - of the HTR are covered. The analyses within the licensing procedure of the HTR-1160 have shown that for normal operation and for the design basis accidents the radiation exposures remain clearly below the maximum permissible levels as prescribed by the radiation protection ordinance, so that no real hazard for the population will arise from them. (Atomindex citation 09:414953)

AED-Conf-78-048-003 PC **A02**/MF **A01**
Zentralstelle fuer Atomkernenergie-Dokumentation, Eggenstein-Leopoldshafen (Germany, F.R.).
Contribution from U.S. System Suppliers to the Power Generating Industry.
R. Wachniack. 1978, 10p CONF-780246-1
International symposium on quality assurance, Bad Neuenahr, F.R. Germany, 27 Feb 1978.
U.S. Sales Only.

Quality assurance, like the nuclear regulation, is here to stay and industry is clearly aware of its impact on performance. Original resistance to quality assurance as a way of life in a technical business has evaporated and the early emphasis on paper and form has diminished. Quality assurance is being accepted as the proper concern of everyone in the business, whether they are engineering, manufacturing, purchasing, plant security, or the quality assurance department. (Atomindex citation 09:414910)

AED-Conf-78-048-004 PC **A03**/MF **A01**
Zentralstelle fuer Atomkernenergie-Dokumentation, Eggenstein-Leopoldshafen (Germany, F.R.).

Quality Assurance in the Nuclear Industry.
D. Knoedler. 1978, 27p CONF-780246-4
In German.International symposium on quality assurance, Bad Neuenahr, F.R. Germany, 27 Feb 1978.
U.S. Sales Only.

Quality assurance is the sum of all activities systematically planned, practiced, and controlled with the aim to assure the quality of deliveries and performances. This assurance today covers all phases of activities, from the planning (including a determination of the required and necessary quality characteristics) to the start-up of a plant. (Atomindex citation 10:421346)

AED-Conf-78-155-023 PC **A02**/MF **A01**
Zentralstelle fuer Atomkernenergie-Dokumentation, Eggenstein-Leopoldshafen (Germany, F.R.).
High-Temperature Helium Experimental Facility as a Large-Scale Pilot Plant.
H. Weiskopf. 1978, 13p CONF-7804102-25
In German.Systems exhibition energy within the context of the Hannover fair, Hannover, F.R. Germany, 19 Apr 1978.
U.S. Sales Only.

No abstract available.

AED-Conf-78-155-026 PC **A03**/MF **A01**
Zentralstelle fuer Atomkernenergie-Dokumentation, Eggenstein-Leopoldshafen (Germany, F.R.).
Solving Protection and Control Tasks in Power Plants.
H. G. Thierfelder. 1978, 38p CONF-7804102-22
In German.Systems exhibition energy within the context of the Hannover fair, Hannover, F.R. Germany, 19 Apr 1978.
U.S. Sales Only.

No abstract available.

AED-Conf-78-155-028 PC **A02**/MF **A01**
Zentralstelle fuer Atomkernenergie-Dokumentation, Eggenstein-Leopoldshafen (Germany, F.R.).
Concept to Handle the Construction of Key-Ready Power Plants.
R. Schmidt. 1978, 14p CONF-7804102-24
In German.Systems exhibition energy within the context of the Hannover fair, Hannover, F.R. Germany, 19 Apr 1978.
U.S. Sales Only.

No abstract available.

AED-Conf-78-155-036 PC **A02**/MF **A01**
Zentralstelle fuer Atomkernenergie-Dokumentation, Eggenstein-Leopoldshafen (Germany, F.R.).
300 MWe THTR Nuclear Power Plant Hamm Uentrop Today.
K. Hoeft. 1978, 11p CONF-7804102-34
In German.Systems exhibition energy within the context of the Hannover fair, Hannover, F.R. Germany, 19 Apr 1978.
U.S. Sales Only.

The overall concept of the THTR is explained and the various phases of its construction up to the end of 1976 are briefly recalled. schematic drawings are shown to illustrate the primary gas circuit with the graphite reflector and the thermal shield, the technical data and the conceptual flow diagram are given, follwed by a brief discussion of a) reactor components (prestressed concrete vessels, steam generator, blowers, shut-down system) b) the after-heat removal system c) the reactor control system d) the secondary circuit, consisting of steam - condensate circuit, closed-cooling system and auxiliary cooling water system. Furthemore, the present state of construction is discused with a view to the fact that it becomes increasingly difficult for reactor operators and construction firms to keep to set dates. (Atomindex citation 09:411869)

AED-Conf-78-155-037 PC **A02**/MF **A01**
Zentralstelle fuer Atomkernenergie-Dokumentation, Eggenstein-Leopoldshafen (Germany, F.R.).
Full-Pressure Safety Containment for the Muelheim-Kaerlich Reactor.
J. Lehmann. 1978, 9p CONF-7804102-23
In German.Systems exhibition energy within the context of the Hannover fair, Hannover, F.R. Germany, 19 Apr 1978.
U.S. Sales Only.

The paper deals with: tasks of the containment; quality assurance; containment penetrations; advantages of its spherical form. There follows a description of assembly. (Atomindex citation 09:405123)

AEEW-R-1197 PC **A04**/MF **A01**
UKAEA, Winfrith. Atomic Energy Establishment.
Systematic Method for Correlating Measurements of Channel Powers with the Lattice Constants in the Neutron Diffusion Equations.
A. N. Buckler. Oct 78, 52p
U.S. Sales Only.

The report describes the theoretical basis of the methods that have been developed for correlating measurements of spatially distributed quantities taken on the reactor with the lattice constants in the diffusion equations. The method can be used with any thermal reactor system of current interest, but the first application is to provide a replacement for the SAMSON code for Winfrith SGHW studies, where the measurements of interest are channel powers. (Atomindex citation 10:437894)

AEEW-R-1209 PC **A03**/MF **A01**
UKAEA, Winfrith. Atomic Energy Establishment.
DELILAH Correlation Code for Adjusting the Parameters of the One-Group Diffusion Equations to Give Best Estimate Power Distributions for Thermal Reactor Systems.
A. N. Buckler. Oct 78, 34p
U.S. Sales Only.

Details of the coding techniques, with flow diagrams are given for the correlation code DELILAH which is a replacement for the SAMSON code for SGHW and other thermal systems. An improved method of rejecting inaccurate channel power measurements is described in detail. A list of the input data requirements for the code will be published separately. (Atomindex citation 10:437895)

AERE-R-9160 PC **A03**/MF **A01**
UKAEA Atomic Energy Research Establishment, Harwell (England).
Improved Calculation of Fission Gas Driven Creep in Fuel Pin Cladding.
J. R. Matthews. Oct 78, 30p
U.S. Sales Only.

The use of the thin shell approximation in calculating the fission gas driven deformation of fast reactor cladding is re-examined for both power law and sinh law creep. It is found that the thin shell approximation using mean clad diameter and temperature may be used with minor adjustment to find clad strain rates. Thick shell analysis is necessary to calculate the clad stress especially when there is a temperature variation through the clad thickness. Methods are described for estimating the effects of local variations in clad shape, thickness and temperature. The simplest approximations are found to be excessively pessimistic when the disturbances are very localised. No significant clad bending accompanying circumferential variations in temperature or configuration was found. (Atomindex citation 10:444713)

ANL-79-70 PC **A03**/MF **A01**
Argonne National Lab., IL.
Numerical Method for Solution of Transient, Homogeneous, Equilibrium, Two-Phase Flows in One Space Dimension.
Y. W. Shin, and A. H. Wiedermann. Oct 79, 28p
Contract W-31-109-ENG-38

A solution method is presented for transient, homogeneous, equilibrium, two-phase flows of a single-component fluid in one space dimension. The method combines a direct finite-difference procedure and the method of characteristics. The finite-difference procedure solves the interior points of the computing domain; the boundary information is provided by a separate procedure based on the characteristics theory. The solution procedure for boundary points requires information in addition to the physical boundary conditions. This additional information is obtained by a new procedure involving integration of characteristics in the hodograph plane. Sample problems involving various combinations of basic boundary types are calculated for two-phase water/steam mixtures and single-phase nitrogen gas, and compared with independent method-of-characteristics solutions using very fine characteristic mesh. In all cases, excellent agreement is demonstrated. (ERA citation 05:010059)

BF-R-62-968-1 PC **A05**/MF **A01**
Battelle-Inst. e.V., Frankfurt am Main (Germany, F.R.).
Status Report on the Conceivable Outside Pressure Exerted on Nuclear Power Stations by Gaseous Explosions.
W. Geiger. 1977, 96p
In German.
U.S. Sales Only.

The following incidents to be taken into account in the whole process beginning with gas release and ending with a possible stress exerted on the power plant building are discussed in detail: Conditions leading to the release of large amounts of gas; formation of an explorable gas mixture cloud; ignition and course of explosion; pressure wave propagation in the surrounding air; construction dynamics and damaging effects. Experimental results obtainable so far and analyses of large explosions are discussed with a view to their consequences. Special emphasis is placed on the question as to whether extremely unfavourable conditions may lead to a detonation of the cloud instead of a deflagration. Considering the physical laws of cloud formation and the special initiation conditions governing free gas-air-mixtures as a result of gas dynamics and reaction kinetics it can be concluded that a detonation seems to be very unlikely. It is examined what kind of studies are still to be canied out in order to clarity the question of a possible detonation. On the other hand, it is not yet possible to give a decisive answer to the question of whether and to what extent nuclear power plants are endangered by gas cloud deflagration. Due to the complex wave field resulting from diffraction and reflexion of the incoming pressure wave by the buildings of the nuclear power station, a variety of stress functions are possible that may, under certain circumstances, lead to a selective excitation of single vibration modes of the structure. (Atomindex citation 10:421102)

CEA-CONF-4035 PC **A02**/MF **A01**
CEA Centre d'Etudes Nucleaires de Saclay, Gif-sur-Yvette (France). Dept. des Etudes Mecaniques et Thermiques.
Study of the Effect of Hard Projectiles Impacting Reinforced Concrete Walls.
C. Berriaud, and A. Sokolovsky. 1977, 5p CONF-7710149-1
In French.ASTE scientific and technical meeting, Paris, France, 26 Oct 1977.
U.S. Sales Only.

Among the risks examined in the framework of nuclear safety in France, quite unlikely events are examined as constituting a safety cover. This type of event includes the possible impact of aircrafts, or rotor splinters. Research on the limit strength of a wall under the impact of a hard projectile presently gives incentive results. First, a good agreement appears between works performed in parallel directions by EDF and CEA. Secondly, the special field of aerial projectiles is much better known as it was with previous formulations. Third, such research highly contributes to the knowledge of the mechanical strength of reinforced concrete structures. (Atomindex citation 09:414829)

CEA-CONF-4156 PC **A02**/MF **A01**
CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France). Dept. des Etudes Mecaniques et Thermiques.
Steam Generator of the HTR Type Reactors.
G. Aubert, Z. Tilliette, M. Bron, and M. Chaboseau. 1977, 23p CONF-7709187-1
In French.Meeting on the steam generators for nuclear power plants, Paris, France, 29 Sep 1977.
U.S. Sales Only.

The evolution of the steam generators of gas-cooled reactors is briefly recalled in the precise case of HTR type reactors: exploitation experience, state of the research and tests in progress. The helical beam technology is briefly described, the specifications of direct-cycle heat exchangers operating at high temperatures and the intermediate exchangers of process heat HTR are discussed. (Atomindex citation 10:445877)

CEA-CONF-4189 PC **A02**/MF **A01**
CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France). Dept. des Etudes Mecaniques et Thermiques.
Seismic Testing Facility 'Tournesol'.
C. Jeandidier, and P. Michon. 1977, 6p CONF-7710149-2
In French.ASTE scientific and technical meeting, Paris, France, 26 Oct 1977.
U.S. Sales Only.

The 'Tournesol' facility is a bi-axial facility intended for seismic simulation, which complements the one-axial simulation facility 'Vesuve'. A description of the facility is given. (Atomindex citation 10:445740)

CEA-CONF-4194 PC **A02**/MF **A01**
CEA Centre d'Etudes Nucleaires de Saclay, Gif-sur-Yvette (France). Services des Piles.
Study of the HTGR Fission Product Migration at the Osiris Experimental Reactor.
A. L'Homme, and M. Lucot. 1977, 12p CONF-771189-2
In French.Symposium on the future of research reactors, Grenoble, France, Nov 1977.
U.S. Sales Only.

A program of study on accidents in HTR reactor operation is presented: blowdown of primary coolant circuit, water inlet into the primary circuit, fuel element overheating by pipe logging or loss of cooling. These studies will be made in Aida irradiation loop in the pool of the Osiris reactor. (Atomindex citation 10:433739)

CEA-N-2038 PC **A02**/MF **A01**
CEA Centre d'Etudes Nucleaires de Saclay, Gif-sur-Yvette (France). Dept. des Etudes Mecaniques et Thermiques.
Short Analysis of a Progressive Distorsion Problem (Tension and Cyclic Torsion).
Roland Roche. Jun 78, 20p
In French.
U.S. Sales Only.

Tests on ratcheting (or progressive distorsion) are in progress in Saclay. A thin tube is subjected to a constant tensile load and to a cyclic twist. The present paper is a short theoretial analysis of that case. A uniform strain and stress field is considered with a constant tensile stress P (primary stress) and a cyclic shearing strain. The shearing strain is known by the corresponding elastic equivalent stress intensity (TRESCA criterion). The cyclic range of the stress intensity is delta Q (secondary stress range). Are examined the shake down condition and the incremental elongations with different constitutive equations of the material. Special attention is given to perfect plasticity and bilinear kinematic hardening results are presented, but it is believed that these materials mathematical models are simplistic and special experimental tests are proposed. (Atomindex citation 10:463542)

CEGB-RD/B/N-4097 PC **A03**/MF **A01**
Central Electricity Generating Board, Berkeley (UK). Berkeley Nuclear Labs.
Pellet Cladding Interactions and Length Changes in SGHWR Fuel Pins. Part 2 - a Computer Model.
I. K. Dickson, and G. Roberts. Oct 77, 26p
U.S. Sales Only.

A computer programme has been developed to predict length changes in SGHWR fuel pins. The model on which it is based allows for irradiation growth in the cladding and a mechanical interaction between fuel and cladding. When fuel pellet/cladding contact is established, continued expansion of the pellet generate stresses in the cladding which can be relaxed by creep in both fuel and cladding. Creep in the cladding produces pin extension, whilst creep in the fuel reduced the capacity of the pellet to expand at any subsequent power ramps by closure of the cracks. Consequently, the relative deformation rates of fuel and cladding determine the overall pin length change. In modelling the expansion and creep behaviour of the fuel, particular attention is paid to the rate at which thermal expansion cracks within the fuel close. The programme enables length changes in any standard design of SGHWR fuel pin, subject to any power history, to be predicted. An extensive range of comparisons between individual programme predictions and measured length changes is given, and it is shown that agreement is good in all cases. The most important conclusions are that the pin extension rate decreases monotonically with increasing burn-up, but passes through a maximum at an intermediate value of rating. (Atomindex citation 10:445891)

CEGB-RD/B/N-4138 PC **A04**/MF **A01**
Central Electricity Generating Board, Berkeley (UK). Berkeley Nuclear Labs.
RICE - A Reactor Inventory Code for Calculating Actinide and Fission Product Arising Using a Point Source Model.
S. Nair. Oct 77, 64p
U.S. Sales Only.

The computer code RICE, which can be used to calculate the actinide and/or fission product inventories of irradiated nuclear fuel, is described. The range of actinide and fission product isotopes considered is large enough to permit studies to be made of the effect of decades-long irradiations and of geological cooling times. The actinide and fission product inventories are calculated for burnup periods using numerical methods best suited to each problem while analytical solutions are used for cooling periods. The code can be used to perform a coupled actinide-fission product calculation, a solely actinide calculation or a solely fission product calculation. Output consists of inventories, activities, biological hazards, decay heating, gamma spectra and macroscopic cross-sections, among others. A brief description is also given of previous work in this field. (Atomindex citation 10:445773)

CEGB-RD/B/N-4306 PC **A03**/MF **A01**
Central Electricity Generating Board, Berkeley (England). Berkeley Nuclear Labs.
Measurements of Velocity and Temperature in the Region Downstream of a Sudden Pipe Expansion.
A. R. Freeman. Jul 78, 47p
U.S. Sales Only.

The results of detailed velocity and temperature measurements are presented for the recirculating region downstream of a sudden pipe expansion in water. The velocity measurements, made using a laser doppler anemometer, also include a limited amount of turbulence information to assist in the formulation of a suitable turbulence model for a computational procedure, temperature measurements, buoyancy, and Reynolds number effects have been investigated over a limited range. No noticeable dependency was found. It is concluded that the data forms a good basis upon which to develop theoretical prediction methods. (Atomindex citation 10:463672)

CONF-791117-20 PC **A03**/MF **A01**
Argonne National Lab., IL.
In-Situ Verification Techniques for Fast Critical Assembly Cores.
S. B. Brumbach, P. I. Amundson, and C. T. Roche. 1979, 34p
Contract W-31-109-ENG-38
ANS topical conference, Kiawah Island, SC, USA, 26 Nov 1979.

Active and passive autoradiographic techniques were used to obtain piece counts of fuel plates in fast critical assembly drawers and to verify the assembly loading pattern. Active autoradiography using prompt-fission and fission-product radiation was more successful with uranium fuel while passive autoradiography was more successful with plutonium fuel. A source multiplication technique was used to measure changes in reactivity when small quantities (2-2.5 kg) of fissile material were removed from a subcritical reference core of the Zero Power Plutonium Reactor. Efforts to compensate for unsuccessful. Some compensation was achieved by replacing U-238 with polyethylene. The sensitivity for detection of partially compensated fuel removed from minimum worth regions was approximately 2.5 kg (fissile) for a core containing 2600 kg (fissile). Substitution of polyethylene was detected with a spectral index which was the ratio of the rate of the In-115 (n, gamma) reaction to the rate of the In-115 (n,n') reaction. This spectral index was sensitive to the presence of an 0.64-cm-thick, 5.08-cm-high polyethylene column 10-15 cm away from the indium foil. The reactivity worth of Pu-239 was also obtained as a function of location in the reactor core with the use of an inverse kinetics technique. Reactivity worths for Pu-239 varied from a maximum of 58.67 Ih/kg near the core center to a minimum of 14.86 Ih/kg at the core edge. (ERA citation 05:013183)

CONF-791118-7 PC **A02**/MF **A01**
Argonne National Lab., IL.
Pulsed Neutron Activation Calibration Technique.
P. Kehler. 1979, 13p
Contract W-31-109-ENG-38
Water reactor safety research information meeting, Gaithersburg, MD, USA, 5 Nov 1979.

A pulsed neutron activation (PNA) for measurement of two-phase flow consists of a pulsed source of fast neutron to activate the oxygen in a steam-water mixture. Flow is measured downstream by an NaI detector. Measured counts are sorted by a multiscaler into different time channels. A counts vs. time distribution typical for two-phase flow with slip between the two phases is obtained. Proper evaluation for the counts/time distribution leads to flow-regime independent equations for the average of the inverse transil time and the average density. After calculation of the average mass flow velocity, the true mass flow is derived. (ERA citation 05:014121)

COO-2985-33 PC **A05**/MF **A01**
General Electric Co., San Jose, CA. Nuclear Energy Engineering Div.
Oxygen Suppression in Boiling Water Reactors. Quarterly Report 3, April 1-June 30, 1978.
E. L. Burley. Dec 78, 92p NEDC-23856-2
Contract EY-76-C-02-2985

Boiling water reactors (BWR's) generally use high purity, no-additive feedwater. The primary recirculating coolant is neutral pH and contains 100 to 300 ppB oxygen and stoichiometrically related dissolved hydrogen. However, oxygenated water increases austenitic stainless steel susceptibility to intergranular stress-corrosion cracking (IGSCC) when other requisite factors such as stress and sensitization are present. Thus, reduction or elimination of the oxygen in BWR water may preclude cracking incidents. This program is to perform an in-depth engineering evaluation of the potential suppression additives supported by critical experiments where required to resolve substantive uncertainties. On the basis of the engineering evaluation, the optimum oxygen suppression technique will be selected and a specific BWR plant recommended for an extended (3-year) plant demonstration experiment. (ERA citation 05:011870)

COO-4570-T1 PC **A02**/MF **A01**
Massachusetts Inst. of Tech., Cambridge.
Evaluation of Improved Light Water Reactor Core Designs. Final Progress Report, September 1979. LWRCD-20.
31 Oct 79, 13p
Contract EN-77-S-02-4570

The work conducted under this research project has developed information which supports in all respects the U.S. position evolved under the NASAP/INFCE programs with respect to the near and intermediate term potential for ore conservation in LWRs on the once-through fuel cycle. Moreover, in the even longer term, it has been confirmed that contention by Edlund and others that tight-pitch Pu/UO sub 2 PWR cores can achieve conversion ratios which may allow these reactors to provide a competitive energy source far into the ore-scarce post-2000 era. (ERA citation 05:013573)

DOE/NE-0003/1 PC **A10**/MF **A01**
Department of Energy, Washington, DC.
Light-Water Reactors: Preliminary Safety and Environmental Information Document. Volume I.
Jan 80, 221p

Information is presented concerning the reference PWR reactor system; once-through, low-enrichment uranium-235 fuel, 30 MWD per kilogram (PWR LEU(5)-OT); once-through, low-enrichment, high-burnup uranium fuel (PWR LEU(5)-Mod OT);

self-generated plutonium spiked recycle (PWR LEU(5)-Pu-Spiked Recycle); denatured uranium-233/thorium cycle (PWR DU(3)-Th Recycle DU(3)); and plutonium/thorium cycle (Pu/ThO sub 2 Burner). (ERA citation 05:013574)

DOE/NE-0003/2 PC **A07**/MF **A01**
Department of Energy, Washington, DC.
Heavy-Water Reactors: Preliminary Safety and Environmental Information Document. Volume II.
Jan 80, 130p

Information is presented concerning the modifications relative to the CANDU reactor; and a once-through fuel cycle with 1.2% enriched uranium-235 and a burnup of 20,000 MWd/MT. (ERA citation 05:013575)

DOE/NE-0003/3 PC **A09**/MF **A01**
Department of Energy, Washington, DC.
Light-Water Breeder Reactors: Preliminary Safety and Environmental Information Document. Volume III.
Jan 80, 178p

Information is presented concerning prebreeder and breeder reactors based on light-water-breeder (LWBR) Type 1 modules; light-water backfit prebreeder supplying advanced breeder; light-water backfit prebreeder/seed-blanket breeder system; and light-water backfit low-gain converter using medium-enrichment uranium, supplying a light-water backfit high-gain converter. (ERA citation 05:013576)

DOE/NE-0003/4 PC **A10**/MF **A01**
Department of Energy, Washington, DC.
High-Temperature Gas-Cooled Reactors: Preliminary Safety and Environmental Information Document. Volume IV.
Jan 80, 219p
P.

Information is presented concerning medium-enriched uranium/thorium once-through fuel cycle; medium-enrichment uranium-233/thorium recycle fuel; high-enrichment uranium-235/thorium recycle (spiked) fuel cycle; high-enrichment uranium-233/thorium recycle (spiked) fuel cycle; and gas-turbine high-temperature gas-cooled reactor. (ERA citation 05:013577)

DOE/NE-0003/5 PC **A06**/MF **A01**
Department of Energy, Washington, DC.
Gas-Cooled Fast Reactors: Preliminary Safety and Environmental Information Document. Volume V.
Jan 80, 114p

Information is presented concerning a homogeneous plutonium/uranium oxide core with thorium oxide axial and radial blankets and spiked recycle. (ERA citation 05:013578)

DOE/NE-0003/6 PC **A08**/MF **A01**
Department of Energy, Washington, DC.
Liquid-Metal Fast-Breeder Reactors: Preliminary Safety and Environmental Information Document. Volume VI.
Jan 80, 175p

Information is presented concerning LMFBR design characteristics; uranium-plutonium/uranium recycle homogeneous core; uranium-plutonium/uranium spiked recycle heterogeneous core; uranium-plutonium/uranium spiked recycle homogeneous core; uranium-plutonium/thorium spiked recycle heterogeneous core; uranium-plutonium/thorium spiked recycle homogeneous core; thorium-plutonium/thorium spiked recycle homogeneous core; denatured uranium-233/thorium cycle homogeneous core; safety consideration for the LMFBR; and environmental considerations. (ERA citation 05:013579)

DOE/TIC-11031 PC **A02**/MF **A01**
Oak Ridge National Lab., TN.
Demonstration of a Pattern Recognition System at the HFIR.
W. H. Sides, Jr., and K. R. Piety. Aug 79, 13p
Contract W-7405-EMG-26

The noise signals from the sensors in a system, such as a nuclear power plant, contain information concerning its current operating condition. Changes in these noise signals may reflect a change in operating condition. Interpretation of these changes may provide the operator with timely detection and diagnosis of anomalous conditions. A pattern recognition system was developed at ORNL to continuously monitor these noise signals on-line in unattended operation. The system was designed to provide a detailed record of the power spectral density values (PSDs) of the signals and their statistical characteristics. Through statistical comparison of current and past PSDs (pattern recognition), the system can detect changes in the noise signals. The system was demonstrated at the High Flux Isotope Reactor (GFIR) by continuously monitoring two neutron signals through four consecutive reactor fuel cycles from April through July 1979. (ERA citation 05:011903)

DOE/TIC-11038 PC **A03**/MF **A01**
Argonne National Lab., IL.
Sodium Hydride Precipitation in Sodium Cold Traps.
C. C. McPheeters, and D. J. Raue. Oct 79, 29p
Contract W-31-109-ENG-38

A series of experiments have been performed to test a calculational model for precipitation of NaH in sodium cold traps. The calculational model, called ACTMODEL, is a computer simulation that uses the system geometry and operating conditions as input to calculate a mass transfer coefficient and the distribution of NaH in a cold trap. The ACTMODEL was tested using an analytical cold trap (ACT) that is simple and essentially one-dimensional. The ACT flow and temperature profile may be controlled at any desired condition. The ACT was analyzed destructively after each test to measure the actual NaH distribution. Excellent agreement was obtained between the ACTMODEL simulations and the experiments. (ERA citation 05:011887)

DOE/TIC-11039 PC **A02**/MF **A01**
Argonne National Lab., IL.
Experiments on Cold Trap Regeneration by NaH Decomposition.
C. C. McPheeters, S. B. Skladzien, and D. J. Raue. Oct 79, 23p
Contract W-31-109-ENG-38

Cold trap regeneration may be very important in future LMFBRs because of the expected high hydrogen source from the steam generators. This hydrogen precipitates as NaH in the cold trap and may fill the trap within one year of operation. Several methods of cold trap regeneration were considered, but the simplest and least expensive appears to be decomposition of NaH under vacuum at elevated temperatures. Experiments were done to assess the feasibility of this method for cold trap regeneration. Small-scale simulated cold traps (SCT) were located with NaH and NaH plus Na sub 2 O, and were heated both under vacuum and under a sweep gas at 100 kPa. The evolved hydrogen was converted to water by a CuO bed and collected in a weighting tube. (ERA citation 05:011888)

DOE/TIC-11060 PC **A02**/MF **A01**
Hanford Engineering Development Lab., Richland, WA.
SIEX Design Predictions for the PNC Fuel Pins in the HEDL P-E01 Power-to-Melt Test.
1979, 13p
Contract EY-76-C-14-2170

During the design phase of the HEDL P-E01 power-to-melt test, a series of design predictions were generated for the three PNC pins using the SIEX fuel pin modeling code. This document tabulates a series of selected PNC pin design predictions as requested by M. Shinohara during his visit to HEDL (October 8-19, 1979). (ERA citation 05:011919)

EGG/LTR-LO-00-79-110 PC **A03**/MF **A01**
EG and G Idaho, Inc., Idaho Falls.
Fast Loop Facility Nitrogen Injection System Operation Test.
T. H. Chen. 3 Jan 80, 30p
Contract EY-76-C-07-1570

The results are presented of the Nitrogen Injection System Operation test, which was run in the FAST Loop at LOFT Test Support Facility (LTSF) in the Idaho National Engineering Laboratory. The primary purpose of this test is to evaluate the feasibility of injecting the nitrogen gas into the FAST Loop Facility to simulate two-phase flow conditions for a later scheduled Pulse Neutron Activation (PNA) test, and determine the maximum attainable void fraction without causing severe damage to the main coolant pump. The test results indicate that the two-phase operation of FAST Loop is possible with injecting nitrogen but that the maximum void fraction should not exceed 35% for this type operation. (ERA citation 05:013548)

EGG/YBR-11-80 PC **A08**/MF **A01**
Idaho National Engineering Lab., Idaho Falls.
WRRD Monthly Report for December 1979.
Jan 80, 152p
Contract EY-76-C-07-1570

Information is presented concerning the Semiscale program; the thermal fuels behavior program; the 3D program; code development and analysis program; and code assessment and applications program. (ERA citation 05:013600)

ENICO-1025 PC **A04**/MF **A01**
Exxon Nuclear Idaho Co., Inc., Idaho Falls.
Instrument Installation Design Criteria Safeguards Test and Evaluation System.
E. P. Wagner. 15 Aug 79, 73p
Contract AC07-79ID01675

Improved safeguards can be achieved by installing the latest sensor and instrument technology to allow process and nuclear material monitoring and data analysis with a high-speed data processing system. The design concept of such a system is presented. A primary objective of the safeguards development program is installation of a test and evaluation system in the Idaho Chemical Processing Plant at INEL for plant sensor and instrument operational testing. The system will be assembled over the next 20 months for test and evaluation support starting in FY 1980. Two parallel efforts are initiating the system development. The first is the data acquisition and processing system design by a joint INEL effort with EG and G and ENICO personnel. The second is a detailed ICPP installation design. The ICPP installation is emphasized for the purpose of providing background for the detailed installation design. (ERA citation 05:013184)

EUR-5463 PC **A08**/MF **A01**
Commission of the European Communities, Petten (Netherlands). Joint Nuclear Research Center.
Second Euratom Sponsored 900 exp 0 C HTR Fuel Irradiation Experiment in the HFR Petten Project E 96.02: Pt.2. Post-irradiation Examination.
R. Roettger, J. de Bueger, and T. Schoots. 1977, 156p
U.S. Sales Only.

A large variety of HTR fuel specimens, loose coated particles, coupons and compacts provided by Belgonucleaire, the Dragon Project and the KFA Juelich have been irradiated in the HFR at Petten at about 900 exp 0 C up to a maximum fast neutron fluence of about 7x10 exp 21 cm exp -2 (EDN) as a Euratom sponsored experiment. The maximum burn-ups were between 11 and 18.5% FIMA. The results of the post-irradiation examinations, comprising visual inspection, dimensional measurements, microradiography, metallography, and burn-up determinations are presented in this part 2 of the final report. The examinations have shown that the endurance limit of most of the tested fuel varieties is beyond the reached irradiation values. (Atomindex citation 10:423848)

EUR-5658 PC **A03**/MF **A01**
Commission of the European Communities, Ispra (Italy). Joint Research Centre.
Application of Heterogeneous Method for the Interpretation of Exponential Experiments.
G. Birkhoff, and L. Bondar. 1977, 44p
U.S. Sales Only.

The present paper gives a brief review of a work which was executed mainly during 1967 and 1968 in the field of the application of heterogeneous

methods for the interpretation of exponential experiments with ORGEL type lattices (lattices of natural uranium cluster elements with organic coolants moderated by heavy water). In the frame of this work a heterogeneous computer program, in (r, gamma) geometry was written which is based on the NORDHEIM method using a uniform moderator, three energy groups and monopole and dipole sources. This code is especially adapted for regular square lattices in a cylindrical tank. Full use of lattice symmetry was made for reducing the numerical job of the theory. A further reduction was obtained by introducing a group averaged extrapolation distance at the external boundary. Channel parameters were evaluated by the PINOCCHIO code. Comparisons of calculated and measured thermal neutron flux showed good agreement. (Atomindex citation 10:423683)

EUR-5709 PC **A03**/MF **A01**
Commission of the European Communities, Ispra (Italy). Joint Research Centre.
Delay Function in Finite Difference Models for Nuclear Channels Thermo-Hydraulic Transients.
A. Agazzi. 1977, 38p
U.S. Sales Only.

The study of the thermo-hydraulic transients in a nuclear reactor core often requires a bi- or tri-dimensional mathematical simulation of a reactor channel. The equations involved are generally solved by means of finite-difference methods. The determination of the spatial mesh-width and the time interval is strongly conditioned by the necessity of a good accuracy in the description of the delay function which defines the transfer of thermal perturbations along the cooling channel. The effects of both space and time discretization on the delay function are considered and for the classical cases of inlet temperature step and ramp universal functions and diagrams are given in order to make possible the determination of optimal spatial mesh-width and time interval, once the requested accuracy of the model is fixed in advance. (Atomindex citation 10:423786)

EUR-5841 PC **A07**/MF **A01**
Commission of the European Communities, Petten (Netherlands). Joint Nuclear Research Center.
Post-Irradiation Examination of a 1300 exp 0 C-HTR Fuel Experiment Project J 96.M3.
J. de Bueger, and H. Roettger. 1977, 134p
U.S. Sales Only.

A large variety of loose coated fuel particles have been irradiated in the BR2 at Mol/Belgium at temperatures between 1200 exp 0 C and 1400 exp 0 C and up to a fast neutron fluence of 1.2x1022 cm exp -2 (E>0.1 MeV) as a Euratom sponsored experiment for the advanced testing of HTR fuel. The specimens have been provided by Belgonucleaire and the Dragon Project. A short description of the experiment as well as the results of post-irradiation examination mainly carried out at Petten (N.H.), The Netherlands, are presented. The post-irradiation examination has shown that the required performance can be achieved by a number of the tested fuel specimens without serious damage. (Atomindex citation 10:423847)

FEI-705 PC **A02**/MF **A01**
Gosudarstvennyi Komitet po Ispol'zovaniyu Atomnoi Energii SSSR, Obninsk. Fiziko-Energeticheskii Inst.
Calculation of Homogeneous Hydrogen-Containing Reactors by the First Collision Probability Method in the Transport Approximation.
B. G. Ryazanov, V. N. Gurin, and A. M. Poplavko. 1976, 21p
In Russian.
U.S. Sales Only.

An algorithm for calculating the effective transport cross sections of hydrogen is described and an algorithm for their use in kinetic programs is developed. These constants have been tested in the computations of the effective breeding coefficient Ksub(eff) of hydrogen-containing breeder systems of high enrichment, characterized by various geometry the computations being based both on the diffusion 26-group approximation and on the method of collision probabilities using the program VERSTA. The computation results lead to the following conclusions: the effective hydrogen cross sections make it possible to calculate Ksub(eff) of hydrogen-containing systems in the diffusion approximation with an accuracy which is not below that of the P sub 1 -approximation method; Ksub(eff) of plane assemblies, computed by the programs VERSTA, DIOR and DSN agree well with each other. There is a 3%-discrepancy between these results and those computed by the program DSN for assemblies without a reflector; the use of effective transport hydrogen cross sections makes it possible to estimate by means of the program VERSTA Ksub(eff) of the interacting assemblies, ring reactors, reactors with a remote reflector with an accuracy +-2%. (Atomindex citation 10:421314)

GA-A-14664 PC **A06**/MF **A01**
General Atomic Co., San Diego, CA.
One-Fifth-Scale Fuel Element Column Shake Test. Final Report.
J. Fischer, J. E. Rakowski, and B. E. Olsen. Sep 79, 105p
Contract AT03-76ET35300

A series of seismic tests were performed on a one-fifth-scale HTGR fuel element column. The column was subjected to static deflections, free vibrations, and uniaxial and biaxial horizontal and vertical sinusoidal and earthquake time history excitations. Main parameters measured were column displacements and element impact forces, dowel forces, and rocking angles. (ERA citation 05:011879)

GA-A-15551 PC **A02**/MF **A01**
General Atomic Co., San Diego, CA.
Natural Convection Effects in a GCFR Subassembly During Loss of Flow with Scram Conditions.
M. Z. Croft, J. V. Del Bene, and A. Torri. Oct 79, 13p CONF-790816-85
Contract EY-76-C-03-0167-023
International meeting on fast reactor safety technology, Seattle, WA, USA, 19 Aug 1979.

Natural convection in a full length GCFR fuel assembly was investigated by experiment and analysis. Non-convecting analysis is shown to be in substantial disagreement with experiment. A new natural convection model using the SCORIA code for GCFR fuel assemblies and the COBRA-IV model for natural convection is presented. The SCORIA/COBRA analytic predictions agree much better with the experiment. The remaining differences are qualitatively explainable. (ERA citation 05:010138)

GA-A-15556 PC **A02**/MF **A01**
General Atomic Co., San Diego, CA.
Event Sequence Quantification for a Loss of Shutdown Cooling Accident in the GCFR.
M. Frank, and J. Reilly. Oct 79, 14p CONF-790816-84
Contract EY-76-C-03-0167-023
International meeting on fast reactor safety technology, Seattle, WA, USA, 19 Aug 1979.

A summary is presented of the core-wide sequence of events of a postulated total loss of forced and natural convection decay heat removal in a shutdown Gas-Cooled Fast Reactor (GCFR). It outlines the analytical methods and results for the progression of the accident sequence. This hypothetical accident proceeds in the distinct phases of cladding melting, assembly wall melting and molten steel relocation into the interassembly spacing, and fuel relocation. It identifies the key phenomena of the event sequence and the concerns and mechanisms of both recriticality and recriticality prevention. (ERA citation 05:010139)

GA-A-15579(V.2) PC **A11**/MF **A01**
JAYCOR, Del Mar, CA.
CASY: A Dynamic Simulation of the Gas-Cooled Fast Breeder Reactor Core Auxiliary Cooling System. Volume II. Example Computer Run.
Sep 79, 237p
Contract AT03-76SF71023

A listing of a CASY computer run is presented. It was initiated from a demand terminal and, therefore, contains the identification ST0952. This run also contains an INDEX listing of the subroutine UPDATE. The run includes a simulated scram transient at 30 seconds. (ERA citation 05:008477)

GA-A-15606 PC **A19**/MF **A01**
General Atomic Co., San Diego, CA.
HTGR Generic Technology Program. Semiannual Report for the Period Ending September 30, 1979.
Nov 79, 439p
Contract AT03-76ET35300

The technical accomplishments on the HTGR Generic Technology Program at General Atomic during the second half of FY-79 are reported. The report covers a period when the major design direction of the National HTGR Program is in the process of changing from the HTGR-SC emphasis to an HTGR-GT emphasis in the near term. The HTGR Generic Technology Program activities have been redirected to ensure that the tasks covered are supportive of this changing emphasis in HTGR applications. The activities include the need to develop an MEU fuel, and the need to qualify materials and components for the higher temperatures of the gas turbine plant. (ERA citation 05:011921)

GA-A-15611 PC **A07**/MF **A01**
General Atomic Co., San Diego, CA.
HTGR Process Heat Program Design and Analysis. Final Report, FY-79.
Dec 79, 130p
Contract AT03-76SF71061

This report summarizes the results of concept design studies at General Atomic Company during FY-79 for an 842-MW(t) Very High Temperature Reactor (VHTR) utilizing an intermediate helium heat transfer loop to provide thermal energy for the production of hydrogen or reducing gas (H sub 2 + CO) by steam-reforming of a light hydrocarbon. Basic carbon sources may be coal, residual oil, or oil shale. The report summarizes conceptual design tasks conducted on the prestressed concrete reactor vessel, thermal barrier, intermediate heat exchanger, reformer, and steam generator. The substantial completion of first generation programming for a performance/optimization code and the preparation of a topical safety report and other safety evaluation studies are reported. The completion of balance of plant criteria specifications and a balance of plant cost estimate is also reported. (ERA citation 05:011899)

GEFR-SP-170 PC **A03**/MF **A01**
General Electric Co., Schenectady, NY.
Application of a High Temperature Gas Cooled Nuclear Reactor for the Production of Secondary Energy Sources and Chemicals.
J. W. Flock, and P. G. Kosky. 1979, 33p CONF-7909116-1
Contracts EN-77-C-02-4057, EY-76-C-02-2676
American Gas Association synthetic fuels committee meeting, Miami Beach, FL, USA, 12 Sep 1979.

The Department of Energy has funded studies of the use of High Temperature Gas Cooled Nuclear Reactors (HTR) to supply energy to convert raw chemicals to useful secondary energy carriers and chemical products. The helium-cooled, graphite-moderated HTR is a unique source for such primary energy in that it is capable of delivering heat at high temperatures. There are currently two candidate HTR designs. Favored in the US is General Atomic's Prismatic Core HTR such as commercially installed at Fort St. Vrain. Under development in West Germany is a prototype Pebble Bed Reactor (PBR). Two primary applications of HTR heat have been considered. These are the Thermochemical Energy Pipeline (TCP) and diverse coal conversion processes. (ERA citation 05:013585)

GRS-F-54 PC **A03**/MF **A01**
Gesellschaft fuer Reaktorsicherheit m.b.H., Cologne (Germany, F.R.).
List of Reports on Reactor Safety Research by BMFT, USNRC, EPRI and JSTA. Period under Review: 1ST January Until 31ST March 1978. Progress Report.
May 78, 37p
In German.
U.S. Sales Only.

This list reviews reports from the Federal Republic of Germany, from the United States of America and from Japan concerning special problems in the field of Reactor Safety Research. According to the cooperation of the Bundesminister fuer For-

chung und Technologie (BMFT) with the United States Regulatory Commisssion (USNRC), the Electric Power Research Institute (EPRI), and the Japan Science and Technology Agency (JSTA) these reports are available in the Gesellschaft fuer Reaktorsicherheit. The list pursues the following order: Country of origin, problem area concerned, according to the Reactor Safety Research Program of BMFT, reporting organisation. The list of reports appears quarterly. Requests for reports should be addressed to GRS, Forschungsbetreuung. Contractual view points have to be considered for the distribution of the reports. (Atomindex citation 09:415110)

IAE-2929 PC **A02**/MF **A01**
Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Atomnoj Ehnergii.
Technique and Programs for Two- and Three-Dimensional Calculations of Energy Release Fields in Reactors with Hexagonal Geometry.
S. N. Barkov, and A. Yu. Sergeev. 1977, 16p
In Russian.
U.S. Sales Only.

Described are the technique and programs for two- and three-dimensional calculations of energy release fields in reactors with hexagonal geometry. The neutron transport is described by two-group diffusion equations, which are transformed to four-point finite-difference form for two-dimensional geometry, and to six-point form for three-dimensional calculations. Considered are the methods of iteration process acceleration, namely: the Viland method, which allows one to reduce the calculation time by 6-8 times for thermal reactors and by 4-6 times for fast reactors, and the method of spectrum double shift, which reduces the calculation time by 4 times. The acceleration methods used guarantee the stability of calculation and acceleration at any skews of energy release fields in reactors. The programs are written in the FORTRAN language for the BESM-6 computer. (Atomindex citation 10:446331)

IAE-3015 PC **A02**/MF **A01**
Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Atomnoj Ehnergii.
Calculation of Temperature Fields and Components of Velocity Vector in Rod-Type Fuel Element Clusters in the Boundary Layer Approximation.
K. I. Pelageichenko, and M. D. Segal. 1978, 8p
In Russian.
U.S. Sales Only.

The method of calculation of temperature fields, longitudinal and transverse components of the velocity vector in gas flow in rod-type fuel element clusters is described. The problem is solved in two-dimensional geometry for cylindrical configuration. The algorythm of the problem solution was obtained and impiemented as the program on the BESM-6 computer. The calculation time of a typical variant is not more than 3-4 min. Numerical value of the velocity transverse component does not exceed 5% from the longitudinal one. The calculation error is equal to approximately 0.6%. In clusters of smooth rods at radial coefficients of heat release field non-uniformity up to 1.5 the effect of velocity-vector transverse component on the formation of temperature fields was not found. (Atomindex citation 10:445717)

IAE-3049 PC **A02**/MF **A01**
Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Atomnoj Ehnergii.
Mathematical Model for Calculation of Velocity, Temperature and Pressure Fields in a Hydraulic Circuit of Reactor with "Porous" Heat-Generating Medium.
L. P. Smirnov, and M. D. Segal. 1978, 12p
In Russian.
U.S. Sales Only.

Set is the problem for calculations of two-dimensional temperature fields, pressures and velocities in a heat generating assembly with peblie fuel elements and radial flow of viscous, compressible coolant with variable physical properties. In adopted assumptions written are equations and boundary conditions in analytical finite-difference form for collectors and a porous energy-releasing medium. The possibility of the method application is considered and the way for equations of motion and energy splitting is suggested for their subsequent solution according to the diagram of variable directions with the adopted boundary conditions. The scheme of solution joining on the boundaries of regions is proposed. The finite-difference analogs for the solutions of initial equations on the boundaries of the region are described. The finite difference method for splitted equation solution along eac each directions has been selected. (Atomindex citation 10:445720)

IAEA-R-1803-F PC **A09**/MF **A01**
International Atomic Energy Agency, Vienna (Austria).
Analysis of the Determining Factors in the Attitude of an Organ of Information Vis-a-Vis the Development of Nuclear Energy. Final Report for the Period 1 June 1976 - 31 May 1978.
F. Fagnani. Sep 78, 176p
In French.
U.S. Sales Only.

The report is devoted to the study of the role of the media, in France, confronted with the nuclear debate. It has been developed through two distinct and complementary approaches, which are illustrative of the possible attitudes towards the research on media impacts. The first approach deals with a systematic qualitative and quantitative review of the various French newspapers (national and regional). With the help of a sample of events running from January 68 to August 76, this study aims at a classification of the periodicals according to their behavior towards the nuclear issues. It also tries to make assumptions on the role of the press in the public opinion regarding that matter. The second approach follows an inverse scope. By using the result of a survey on a representative sample of French adult population, regarding the nuclear debate, this study concentrates on the individuals as readers of different newspapers. On another side, individuals are characterized according to their answers to a series of arguments about nuclear energy. In order to refine the impact of the press, this study puts emphasis on the degree of coherence between the general ideological position and the arguments on nuclear. It is proposed to interpret the discrepancies observed in terms of differential media impacts. (Atomindex citation 10:441335)

IBK-1430 PC **A03**/MF **A01**
Institut za Nuklearne Nauke Boris Kidric, Belgrade (Yugoslavia).
RB Reactor Nuclear Data.
M. Pesic, and O. Sotic. 1977, 40p
In Serbian.
U.S. Sales Only.

For the interpretation of experiments on reactor RB it is necessary to know physical and nuclear characteristics of materials and components of that assembly. In this paper, data for material components of the reactor RB, its material composition and configuration of standard cell lattices of the core are systematically given. The basic two-group nuclear constants for standard cell lattices of reactor RB, calculated by programmes from the NET IBK Programme Library in the Nuclear Engineering Laboratory are also given. (Atomindex citation 10:421313)

IDO-1570-T31 PC **A02**/MF **A01**
EG and G Idaho, Inc., Idaho Falls.
Investigation of Optimal Redundancy for a Specific System Objective.
J. M. Griffith, and D. M. Rasmuson. 1979, 23p
Contract EY-76-C-07-1570

Component redundancy is an effective technique for reducing system unavailability. However, the mathematical models relating redundance and unavailability are generally complex, and casual inspection does not reveal which components should be made redundant to reduce unavailability. This paper develops a method for determining which components are made redundant with the greatest concomitant unavailability reduction. The method was used to study three system designs. For each design it was possible to identify several components which could be made redundant with an associated reduction in unavailability. However, the method also demonstrated that making most components redundant does not reduce unavailability, and in one case a component redundancy actually increased unavailability. Application of the present method helps the designer develop insight concerning the role of component redundancy in a system design without complex calculations and interpretations. 6 figures, 1 table. (ERA citation 05:011923)

IEA-DT-016 PC **A04**/MF **A01**
Instituto de Energia Atomica, Sao Paulo (Brazil).
Optimization of the Core of a 600 MV HTGR Reactor.
J. A. D. Dieguez. Apr 78, 58p
In Portuguese.Thesis.
U.S. Sales Only.

Through a thermal analysis, several reactor core parameters are considered, viz.: cooling channel diameter, juel channel diameter, distance between two channels power generated for lenght unit, etc. Using several criteria, the best solution or solutions are chosen. (Atomindex citation 10:421305)

IEA-DT-048 PC **A05**/MF **A01**
Instituto de Energia Atomica, Sao Paulo (Brazil).
Streaming Effect in Gas-Cooled Fast Breeder Reactors.
I. Collussi. 77p
In Portuguese.Thesis.
U.S. Sales Only.

The importance of neutron streaming in the GCFR is evaluated by taking into consideration the anisotropy due to coolant and control rod channels. Calculation is done using a numerical-analytical method developed in this paper and compared with results obtained using the methods of Benoist and Ligou. Comparison of the results obtained by these three methods shows that streaming effect is strongly dependent on the axial buckling 'B exp 22 '. The influence of neutron streaming on the reactivity is shown to be negligilbe and, in consequence, the GCFRs may be considered homogeneous to a good approximation. For accurate calculation the neutron streaming should be considered, mainly for radiation damage and shielding calculation. (Atomindex citation 10:430842)

IEA-DT-065 PC **A08**/MF **A01**
Instituto de Energia Atomica, Sao Paulo (Brazil).
Preliminary Definition of the Parameters of an Experimental Natural - Uranium, Graphite - Moderated, Helium - Cooled Power Reactor.
O. Baltazar. Jul 78, 160p
In Portuguese.Thesis.
U.S. Sales Only.

A preliminary study of the technical characteristic of an experiment at 32 MWe power with a natural uranium, graphite-moderated, helium cooled reactor is described. The national participation and the use of reactor as an instrument for the technological development of future high temperature gas cooled reactor is considered in the choice of the reactor type. Considerations about nuclear power plants components based in extensive bibliography about similar English GCR reactor is presented. The main thermal, neutronic an static characteristic and in core management of the nuclear fuel is stablished. A simplified scheme of the secondary system and its thermodynamic performance is determined. A scheme of parameters calculation of the reactor type is defined based in the present capacity of calculation developed by Coordenadoria de Engenharia Nuclear and Centro de Processamento de Dados, IEA, Brazil. (Atomindex citation 10:430757)

INIS-mf-3980 PC **A02**/MF **A01**
Nuclear Regulatory Commission, Washington, DC.
U.S. Nuclear Regulatory Commission Inspection Experience with Nuclear Power Plant Commissioning.
B. H. Grier. 1977, 6p CONF-7709126-14
Meeting on regulatory inspection practices in nuclear power plants, Madrid, Spain, 20 Sep 1977.
U.S. Sales Only.

During the commissioning of a nuclear power plant, the owner (licensee) must conduct a successful preoperational testing program before an operating license is issued and must also conduct

a successful startup testing program to provide the necessary assurance that the plant can be operated in accordance with design requirements and in a manner that will not endanger the health and safety of the public. The required tests have been delineated by the NRC on a generic basis. The actual tests to be performed at a specific facility are determined on a case-by-case base. The experience of the NRC during inspection of commissioning programs is discussed. (Atomindex citation 09:371275)

INIS-mf-4060 PC **A02**/MF **A01**
Institute of Radiation Protection, Helsinki (Finland).
Problems and Experience of Regulatory Inspection in Finland During Construction of Nuclear Power Plants.
T. Eurola. 1977, 9p CONF-7709126-12
Meeting on regulatory inspection practices in nuclear power plants, Madrid, Spain, 20 Sep 1977.
U.S. Sales Only.

Following a description of the organisation of nuclear inspections in Finland and the provisions applicable to the different stages in control, an analysis is made of the typical problems affecting statutory inspection work. One key problem area is the availability and sufficient coverage of regulations at an early enough stage of the planned nuclear power plant project. Another source of difficulty has proved to be the availability and sufficiency of information at various inspection stages to enable timely decisions to be taken concerning the areas to be reviewed. (Atomindex citation 09:371264)

INIS-mf-4064 PC **A02**/MF **A01**
Zentralstelle fuer Atomkernenergie-Dokumentation, Eggenstein-Leopoldshafen (Germany, F.R.).
Duties and Responsibilities of the Nuclear Power Inspectorate and the National Radiation Protection Institute in Connection with Nuclear Power Plants.
T. Eckered. 1977, 19p CONF-7709126-11
Meeting on regulatory inspection practices in nuclear power plants, Madrid, Spain, 20 Sep 1977.
U.S. Sales Only.

The two Swedish bodies competent for the control of nuclear energy are the Swedish Nuclear Power Inspectorate (SKI) and the National Swedish Institute on Radiation Protection (SSI). The duties of both bodies in respect of inspection stem from the provisions of the Atomic Energy Act and the Radiation Protection Act. The procedure to be followed for construction and operation of nuclear power plants is described from the viewpoint of the responsibilities entrusted to SKI and SSI. (Atomindex citation 09:371263)

INIS-mf-4234 PC **A05**/MF **A01**
Instituto Politecnico Nacional, Mexico City. Escuela Superior de Fisica y Matematicas.
Determination of the Subcadmium Flux in the Triga Mark III Reactor of the Nuclear Center in Mexico.
Thesis,
F. J. Rodiguez V. 1975, 86p
In Spanish.
U.S. Sales Only.

The determination of the subcadmium flux profile (neutrons with energy between 0 and 0.4 eV approximatley) in the core of the reactor Triga Mark III in the Nuclear Center of Mexico was made. The technique used for that purpose consists in placing alternatively indium sheets covered and uncovered with cadmium and separated by fragments of aluminium 2.54cm wide in an aluminium tube whose external diameter reaches 0.635cm. This tube is introduced in each of the 21 axial irradiation places of the sheets the activity of gamma rays of 1.293 MeV of In-116m produced during the irradiation, is measured using a monochannel analyzer. We obtain graphs of the specific counting ratio vs position for the sheets uncovered and covered with cadmium; using quadratic interpolation we compute in each position the missing specific measuring ratio. The difference between the specific counting ratios with our cadmium and with cadmium multiplied by a constant gives the subcadmium flux in the z point. For irradiation at 10 watts, 1 Kilowatt and 1 megawatt the results show profiles which in general terms are in accordance with those which were obtained theoretically for a cylyndrical reactor using group theory. The greatest flow given by the manufacturer of the reactor is in the values range obtained experimentally.For the calculations, the method uses a FORTRAN IV program so that the determinations can be made routinely. (Atomindex citation 09:402018)

INIS-mf-4260 PC **A02**/MF **A01**
Zentralstelle fuer Atomkernenergie-Dokumentation, Eggenstein-Leopoldshafen (Germany, F.R.).
Evolution of IEEE Nuclear Standards from the Single Failure Criterion and Their Impact on System Design.
D. H. Clark. 1978, 12p CONF-7710184-7
IAEA specialists meeting on the effect of regulatory requirements on nuclear power plant control and instrumentation systems, Madrid, Spain, 4 Oct 1977.
U.S. Sales Only.

One of the first industry standards developed in the United States to meet regulatory agency criteria for the design and installation of nuclear power plant control and instrumentation systems was prepared by the Institute of Electrical and Electronics Engineers, Inc., abbreviated IEEE. This was IEEE Std. 279, first issued in 1968. It was subsequently revised and reissued as IEEE Std. 279-1971 "IEEE Standard: Criteria for Protection Systems for Nuclear Power Generating Stations". Not only has the implementation of this standard had a tremendous impact on nuclear power plant design in the United States, it has been the base document from which subsequent IEEE nuclear standards have been developed. Three major concepts which are addressed by IEEE 279, and which have had a major impact upon control and instrumentation systems in nuclear power plants are the following : 1) Single failure criterion. 2) Equipment qualification. 3) Channel independence. Each of these concepts has resulted in the development of subsequent IEEE Nuclear Standards. The impact of some of these on control and instrumentation systems are discussed. (Atomindex citation 09:402042)

INIS-mf-4263 PC **A02**/MF **A01**
Bechtel Corp., San Francisco, CA.
Nuclear Quality Assurance Programs, Their Role and Their Impacts.
B. L. Lex. 1978, 8p CONF-7710184-4
IAEA specialists meeting on the effect of regulatory requirements on nuclear power plant control and instrumentation systems, Madrid, Spain, 4 Oct 1977.
U.S. Sales Only.

The major steps in the development of control and instrumentation design requirements for a nuclear station, the execution of the detailed design and the procurement, installation and start-up of the control equipment and systems are outlined. The principal quality assurance program requirements related to each of these steps are described and the impact of these requirements on the conduct of the work are examined. (Atomindex citation 09:398913)

INIS-mf-4264 PC **A02**/MF **A01**
Bechtel Corp., San Francisco, CA.
Unsolved Problems in Applying U.S. Regulatory Guides to Control System Equipment.
R. E. Stade. 1978, 11p CONF-7710184-5
IAEA specialists meeting on the effect of regulatory requirements on nuclear power plant control and instrumentation systems, Madrid, Spain, 4 Oct 1977.
U.S. Sales Only.

Two current problems encountered when designing control systems to the United States Regulatory Guide requirements are discussed. They are: 1) Level of surge voltages that should be specified when procuring solid state control and instrumentation systems and equipment. 2) The approach to be used qualifying equipment that must meet the aging requirements. (Atomindex citation 09:398926)

INIS-mf-4265 PC **A02**/MF **A01**
Bechtel Corp., San Francisco, CA.
Safety Considerations for Various Applications of Remote Multiplexing in Nuclear Power Plants.
J. E. Leary. 1978, 13p CONF-7710184-3
IAEA specialists meeting on the effect of regulatory requirements on nuclear power plant control and instrumentation systems, Madrid, Spain, 4 Oct 1977.
U.S. Sales Only.

There is increasing interest in the application of remote multiplexing systems (RMS) for power plant applications. Remote multiplexing can replace the majority of conventional control and instrumentation signal cables. In addition, the RMS can perform control logic functions presently implemented by discrete hardwired circuit elements. The background and trends in the use of RMS and the attendant advantages and concerns are reviewed. Classifications of multiplexed digital systems are presented to show the evolution of this technology in power plant applications. Nuclear safety-related applications of RMS are discussed with emphasis on the impact of selected NRC Regulatory Guides on such applications. (Atomindex citation 09:398912)

INIS-mf-4332 PC **A02**/MF **A01**
Bundesministerium des Innern, Bonn (Germany, F.R.).
Safety Criteria for Nuclear Power Plants. Adopted by the Laenderausschuss fuer Atomkernenergie on Oct 12TH, 1977. Publication Dated 21st Oct 1977.
1977, 21p
In German.
U.S. Sales Only.

The full text of the criteria is published once more. It also contains criterion 1.1. - principles of safety provision - not included in the first publication (BAZ No. 106, 8th June 1977), and amended definitions of the terms discharge and release of radioactive substances. (Atomindex citation 09:392289)

INIS-mf-4432 PC **A02**/MF **A01**
Zentralstelle fuer Atomkernenergie-Dokumentation, Eggenstein-Leopoldshafen (Germany, F.R.).
Reflections on Nuclear Law.
F. Carbone. 1977, 19p CONF-7710196-1
In Italian.Nuclear Inter June 1977, Florence, Italy, 2 Oct 1977.
U.S. Sales Only.

No abstract available.

INIS-mf-4433 PC **A02**/MF **A01**
Zentralstelle fuer Atomkernenergie-Dokumentation, Eggenstein-Leopoldshafen (Germany, F.R.).
Legal Problems Concerning the Export of Nuclear Power Plants.
H. von Pierer. 1977, 8p CONF-7710196-10
Nuclear Inter June 1977, Florence, Italy, 2 Oct 1977.
U.S. Sales Only.

No abstract available.

INIS-mf-4435 PC **A02**/MF **A01**
Zentralstelle fuer Atomkernenergie-Dokumentation, Eggenstein-Leopoldshafen (Germany, F.R.).
Impact of Nuclear Power and Public Acceptance. Licensing of Nuclear Reactors and Public Acceptance in Austria.
G. Plochl. 1977, 8p CONF-7710196-11
Nuclear Inter June 1977, Florence, Italy, 2 Oct 1977.
U.S. Sales Only.

No abstract available.

INIS-mf-4438 PC **A02**/MF **A01**
Zentralstelle fuer Atomkernenergie-Dokumentation, Eggenstein-Leopoldshafen (Germany, F.R.).
Leasing of Nuclear Installations.
E. Capaccioli. 1977, 18p CONF-7710196-4
In Italian.Nuclear Inter June 1977, Florence, Italy, 2 Oct 1977.
U.S. Sales Only.

No abstract available.

INIS-mf-4440 PC **A02**/MF **A01**
Nuclear Energy Agency, Paris (France).
NEA, Nuclear Law and Information Processing.
P. Reyners. 1977, 16p CONF-7710196-2
In French.Nuclear Inter June 1977, Florence, Italy, 2 Oct 1977.

U.S. Sales Only.

No abstract available.

INIS-mf-4441 PC **A03**/MF **A01**
Zentralstelle fuer Atomkernenergie-Dokumentation, Eggenstein-Leopoldshafen (Germany, F.R.).
State Nuclear Initiatives in the United States.
P. L. Strauss, and C. R. Stoiber. 1977, 28p
CONF-7710196-13
Nuclear Inter June 1977, Florence, Italy, 2 Oct 1977.
U.S. Sales Only.

The paper deals with State nuclear initiatives regarding the role of nuclear power in the energy future of the United States. The question of whether and under what circumstances nuclear facilities should be used to generate electricity was put to the popular vote in several States in 1976. Some general principles of Federal-State relations are discussed with specific reference to nuclear regulations. The initiative mechanism itself is described as well as its legal form and background. The parallel developments in the State and Federal legislative consideration of nuclear issues is reviewed and the suggested reasons for the defeat of the proposals in the seven States concerned are discussed. Finally, the author draws some conclusions on the effects of the 1976 initiatives on future decision-making in the US on energy policy in general and nuclear power in particular. (NEA) . (Atomindex citation 09:405378)

INIS-mf-4448 PC **A02**/MF **A01**
Rheinisch-Westfaelisches Elektrizitaetswerk A.G., Essen (Germany, F.R.).
International Harmonization of Reactor Licensing Regulations.
D. Kuhnt. 1977, 24p CONF-7710196-8
Nuclear Inter June 1977, Florence, Italy, 2 Oct 1977.
U.S. Sales Only.

No abstract available.

INIS-mf-4451 PC **A02**/MF **A01**
International Atomic Energy Agency, Vienna (Austria).
IAEA Assistance to Developing Countries in the Regulation of Nuclear Installations.
H. V. Phuong. 1977, 17p CONF-7710196-9
Nuclear Inter June 1977, Florence, Italy, 2 Oct 1977.
U.S. Sales Only.

No abstract available.

INIS-mf-4455 PC **A02**/MF **A01**
Zentralstelle fuer Atomkernenergie-Dokumentation, Eggenstein-Leopoldshafen (Germany, F.R.).
Reflections on Drafting of Civil Liability Clauses and Solving of Disputes in Supply Contracts Throughout the Nuclear Fuel Cycle.
J. Virole. 1977, 13p CONF-7710196-15
In French.Nuclear Inter June 1977, Florence, Italy, 2 Oct 1977.
U.S. Sales Only.

The lengthy duration and diversity of the stages of the fuel cycle and the geographical distribution of the nuclear industries give the contracts for carrying out the different operations such flexibility that in order to settle disputes concerning notably but not exclusively liability, reference may be made to different legal systems according to whether the regulations of international public or private law can be applied. The options provided for co-contractors in view of the flexibility of the contracts lead to adoption of varying clauses for settling disputes according to the different industrial achievements envisaged. (Atomindex citation 09:405380)

INIS-mf-4494 PC **A02**/MF **A01**
Ustav Jaderneho Vyzkumu, Rez (Czechoslovakia).
High-Temperature Reactor.
Jun 77, 8p
In Czech.
U.S. Sales Only.

A survey is presented of helium-cooled high-temperature reactors operated in the world. The fuel for these reactors, its production and costs are described in detail. Specifications are shown of the Dragon, AVR, THTR, Peach Bottom, UHTREX, Fort St. Vrain reactors. The application is described of the reactors in hydrogen and raw iron production. (Atomindex citation 09:414950)

INIS-mf-4590 PC **A06**/MF **A01**
Nuclear Energy Agency, Paris (France).
Nuclear Energy Agency. 6. Activity Report. 1977.
1978, 112p
U.S. Sales Only.

NEA has, as a primary objective, to ensure through international co-operation that the nuclear option is available for consideration in its true worth. The safety and regulatory aspects of nulear development have represented in 1977 about two thirds of NEA's total effort; and a high degree of priority was given to questions of nuclear safety and of radioactive waste management. Similarly, the growing need of Member countries for an integrated appraisal of technical, economic, safety, environmental and political questions influencing the nuclear fuel cycle was increasingly taken into account. Finally, a general effort was made to achieve greater visibility for the positive results of the NEA programme, as a contribution to improved public understanding of the factors underlying nuclear power programmes. As in previous years, the NEA programme continued to involve close collaboration with the International Atomic Energy Agency (IAEA) and the Commission of the European Communities. Within the OECD, close collaboration was maintained with the Combined Energy Staff and the Environment Directorate. (Atomindex citation 10:421607)

INIS-mf-4591 PC **A07**/MF **A01**
Technische Hochschule, Aachen (Germany, F.R.). Fakultaet fuer Maschinenwesen.
Behaviour of Spherical HTR Fuel Elements During Mass Testing in the AVR Reactor.
M. Wimmers. 21 Dec 76, 133p
In German.
U.S. Sales Only.

After a few introductory remarks on the AVR as a test reactor for fuel elements, the different variants of spherical AVR fuel elements are described. Mechanical loads, loads due to radiation, thermal, and corrosive loads on the fuel elements are investigated. The findings of the fuel element testing are presented in detail and discussed. Mass tests are best suited for fuel element testing under realistic reactor conditions. Supplementary to the mostly well-known effects of the loads during normal reactor operation, an investigation of large numbers of fuel elements may yield highly valuable statistically valid data. (Atomindex citation 10:421452)

INIS-mf-4616 PC **A02**/MF **A01**
Atomic Energy Control Board, Ottawa, (Ontario).
Regulation of the Complete Fuel Cycle Current and Proposed Nuclear Legislation in Canada.
F. C. Boyd. 1978, 7p CONF-780584-1
International conference on regulating nuclear energy, Brussels, Belgium, 16 May 1978.
U.S. Sales Only.

The increasing complexity of the Canadian nuclear programme, the problems of contamination and uranium mine safety and the national and international concern about proliferation have emphasized the need for a systematic and strong control over nuclear activities. Although the 1946 Atomic Energy Control Act provides the Atomic Energy Control Board with most of the powers necessary to achieve this, the new Act has been introduced to clarify jurisdiction and to strengthen the Board, which would then be renamed the Nuclear Control Board. Its duty would be to control health, safety and the environmental and other security aspects of the complete fuel cycle. (Atomindex citation 10:421615)

INIS-mf-4617 PC **A02**/MF **A01**
Nuclear Regulatory Commission, Washington, DC.
Treatment of Differing Professional Opinions in the Regulatory Review Process.
H. K. Shapar. 1978, 7p CONF-780584-9
International conference on regulating nuclear energy, Brussels, Belgium, 16 May 1978.
U.S. Sales Only.

The Nuclear Regulatory Commission is an independent body whose purpose is to assure that civilian nuclear activities are consistent with the public health and safety and environmental protection. To this effect, Congress has vested it with the necessary control powers. The question here is how to reconcile diverging opinions expressed within NRC by executives and technicians during the enquiry pocedure for licensing of nuclear installations. The diversity of professional viewpoints should be viewed as a positive factor strengthening the regulatory process and should therefore be maintained. However, decisions must be made; therefore some viewpoints will not prevail but that should not be construed as a signal that the internal discussion process is condemned. NRC staff are entitled to express their views and not subjected to professional and administrative sanctions for doing so. (Atomindex citation 10:421633)

INIS-mf-4618 PC **A02**/MF **A01**
Oskarshamnsverkets Kraftgrupp A.B., Stockholm (Sweden).
Impact of the Nuclear Critics on the Development of the Regulating Process.
T. Roser. 1978, 13p CONF-780584-7
International conference on regulating nuclear energy, Brussels, Belgium, 16 May 1978.
U.S. Sales Only.

The impact of nuclear critics on the regulating process is difficult to analyse as the question is to identify them and to define their aim. In the United States it is generally considered that such critics are the new class of liberal intellectuals who have been politically jolted by Vietnam and Watergate. On this side of the Atlantic, the anti-nuclear movement seems different, less coherent and more complex: the local opposition, the environmentalists and the militant radicals. All these opponents can intervene at three levels: technically they attack the technical standards applied and propose other energy sources. At regulatory level they can influence decision-making provided they are in a majority; politically they take action on behalf of the basic respect of democracy for minorities and individual rights. (Atomindex citation 10:421631)

INIS-mf-4621 PC **A02**/MF **A01**
Atomic Industrial Forum, Inc., New York.
Congressional Impact on Reactor Regulation.
H. S. Price. 1978, 13p CONF-780584-6
International conference on regulating nuclear energy, Brussels, Belgium, 16 May 1978.
U.S. Sales Only.

Congress can stimulate the nuclear option in two ways. First, the chairmen of parliamentary committees and subcommittees whose role is determining and in general the elected bodies who support the nuclear development program as an integral part of the national energy policy. They can dispel doubts and the ambiguous climate in which decision makers in the Executive Branch, the Judiciary of the State and Local Governments now operate, by affirming that the Atomic Energy Act is an expression of the national will. Secondly, Congress can create an effective vehicle for accelerating the licensing procedure for nuclear installations. The Administration's recently proposed Bill on the subject will enable Congress to set up a simplified and hence speedier system. (Atomindex citation 10:421630)

INIS-mf-4622 PC **A02**/MF **A01**
Zentralstelle fuer Atomkernenergie-Dokumentation, Eggenstein-Leopoldshafen (Germany, F.R.).
Hurdles to Regulatory Reform: A Former Regulator's View.
M. A. Rowden. 1978, 10p CONF-780584-8
International conference on regulating nuclear energy, Brussels, Belgium, 16 May 1978.
U.S. Sales Only.

The present paper reviews the numerous obstacles which should be overcome by reforming the regulations on nuclear installations; dual responsibilities of Federal and State Agencies, duplication of tasks entrusted to different Federal Agencies such as EPA and NRC. The sensitivity of public opinion towards nuclear decisions and political interferences are the source of other difficulties. The new Non-proliferation Act and the Licensing Reform Bill are analysed in the light of these considerations. In conclusion, the importance of the recent Supreme Court decision in the Vermont Yankee and Midland cases is emphasized in this context. (Atomindex citation 10:421632)

INIS-mf-4624 PC **A02**/MF **A01**
Atomic Industrial Forum, Inc., New York.
Stability in Licensing Requirements: A Technical Perspective.
R. A. Szalay. 1978, 14p CONF-780584-11
International conference on regulating nuclear energy, Brussels, Belgium, 16 May 1978.
U.S. Sales Only.

The serious difficulties encountered in the licensing procedure for nuclear power plants in the United States have resulted in the elaboration of a Bill on the siting and licensing of nuclear installations for the purpose of reforming the present system. The author fears, however, that this Bill will not reduce the complexity of present regulations and will be unable to reach the object sought which is to reduce the length of the procedure; he analyses the technical and political reasons underlying this situation, and in particular the role of the staff of the Nuclear Regulatory Commission. (Atomindex citation 10:421637)

INIS-mf-4632 PC **A02**/MF **A01**
Centrales Nucleares del Norte, S.A., Madrid (Spain).
Implications of Nuclear Export Policies and Trade on the Current and Future Development in Spain.
J. L. Sanchez. 1978, 12p CONF-780584-2
International conference on regulating nuclear energy, Brussels, Belgium, 16 May 1978.
U.S. Sales Only.

This paper deals with the status of the Spanish nuclear programme. The 1964 Act on nuclear energy authorizes the Spanish Government to conclude bilateral agreements enabling Spain to benefit from the transfer of advanced technologies. In this context, Spain signed an agreement with the U.S. on 20 March 1974 and another agreement with IAEA and the U.S. in June 1974. The paper also envisages the consequences of the U.S. 1978 Non-Proliferation Act on Spain's nuclear activities: need to renegotiate the present agreements, loss of confidence in view of the new conditions imposed (restrictions in export licences) and practical implementation for the three Spanish installations which use enriched fuel of American origin. (Atomindex citation 10:421618)

INIS-mf-4762 PC **A05**/MF **A01**
Statens Vattenfallsverk, Stockholm (Sweden).
Eliminating Nuclear Power.
T. Nyten, and R. Johansson. Oct 77, 93p
In Swedish.
U.S. Sales Only.

A study, initiated by the Swedish Energy Commission, of the possibilities to discontinue the use of nuclear power by year 1985. The report deals with economical, technical and environmental consequences of converting nuclear power stations to coal firing. Comparisons of activity realses from nuclear and coal fired power stations are reported. A review of foreign studies of decommissioning is presented. (Atomindex citation 10:437938)

INIS-mf-4772 PC **A02**/MF **A01**
Gas Breeder Reactor Association, Brussels (Belgium).
Analysis of a Gross Core Melt-down Accident in a Gas Cooled Breeder Reactor.
J. Chermann, M. Defalque, J. J. Dekais, G. Evrard, and S. Pilate. 1978, 9p CONF-781022-73
Meeting on nuclear power reactor safety, Brussels, Belgium, 16 Oct 1978.
U.S. Sales Only.

The present paper presents a first study of the gross core melt-down in a Gas cooled Breeder Reactor with standing core. The migration process of the debris is analysed and the various phenomena which might occur during melting (compacton, recriticality, reactivity insertion, energy release) are assessed. The analysis has shown that, in the most pessimistic conditions, reactivity ramps and energy releases would not exceed 3 $/sec and 8000 MJ respectively. No significant fuel vapourization is anticipated and the Prestressed Concrete Vessel Structure integrity would not be endangered. In terms of fast reactor safety, the accident can therefore be considered as rather mild. (Atomindex citation 10:445911)

INIS-mf-4783 PC **A09**/MF **A01**
Technische Hochschule, Aachen (Germany, F.R.). Fakultaet fuer Maschinenwesen.
Plant Accident Dynamics of High-Temperature Reactors with Direct Gas Turbine Cycle.
Diss. (D.Eng.),
M. L. Waloch. 14 Mar 77, 186p
In German.
U.S. Sales Only.

In the paper submitted, a one-dimensional accident simulation model for high-temperature reactors with direct-cycle gas turbine (single-cycle facilities) is described. The paper assesses the sudden failure of a gas duct caused by the double-ended break of one out of several parallel pipes before and behind the reactor for a non-integrated plant, leading to major loads in the reactor region, as well as the complete loss of vanes of the compressor for an integrated plant. The results of the calculations show especially high loads for the break of a hot-gas pipe immediately behind the flow restrictors of the reactor outlet, because of prolonged effects of pressure gradients in the reactor region and the maximum core differential pressure. A plant accident dynamics calculation therefore allows to find a compromise between the requirements of stable compressor operation, on the one hand, and small loads in the reactor in the course of an accident, on the other, by establishing in a co-ordinated manner the narrowing ratio of the flow restrictors. (Atomindex citation 10:441854)

INIS-mf-5050 PC **A03**/MF **A01**
Atomic Energy Board, Pelindaba, Pretoria (South Africa).
Atomic Energy Board, Republic of South Africa, Twenty Second Annual Report, 1978.
30 Apr 79, 47p
U.S. Sales Only.

Progress is reported on the following: nuclear materials, nuclear power, application of radioisotopes and radiation, health and safety and fundamental studies undertaken in the fields of physics, chemistry, metallurgy, medicine and geology during 1978. The supporting activities of the computer services, engineering services, waste disposal plant, instrumentation section, research reactor and analytical services are given for 1978. The report contains a bibliography of publications published by staff members and bursars of the Atomic Energy Board during 1978. (Atomindex citation 10:463837)

ITEF-122(1977) PC **A03**/MF **A01**
Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Teoreticheskoj i Ehksperimental'noj Fiziki.
Calculational and Experimental Investigations of Tritium Accumulation in Heavy Water Reactors.
B. R. Bergel'son, L. M. Zhakevich, G. M. Kukavadze, L. Ya. Memelova, and D. V. Chuprakov. 1977, 34p
In Russian.
U.S. Sales Only.

A set of equations is derived which determines the tritium (T) buildup in heavy water moderated reactors. The process of T buil odup is assumed to be gverned mainly by the D + n implies T and exp 3 He + n implies T + p reactions as well as by the beta decay of T. A mass-spectrospic method of determining T concentraitons is described at length. The method is based on measuring isotopic composition of helium. For the ITEP reactor tritium concentration has been measured to equal 4.87 +- 0.11 Ci/l. The findings presented show that at neutron fluxes of about 10 exp 14 and 10 exp 15 neutron/cm exp 2 xs the heavy water activity due to T accumulation will amount to 50 and 500-1000 Ci/l respectively after 25-30 yrs. of reactor operation. In the case of fluxes phi > 10 exp 14 neutron/cm exp 2 xs, the contribution of the exp 3 He(n,p)T reaction becomes substantial. (Atomindex citation 10:445957)

ITEF-14(1978) PC **A02**/MF **A01**
Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Teoreticheskoj i Ehksperimental'noj Fiziki.
IRT-2000 Reactor Optimum Operation under the Conditions of Limited Reactivity.
A. S. Gerasimov, A. P. Kryukov, A. P. Trofimov, V. I. Pavlov, and V. D. Simonov. 1978, 24p
In Russian.
U.S. Sales Only.

A technique is presented for optimizing a cyclic regime of the IRT-2000 pool type reactor with the account of xenon poisoning under conditions of limited reactivity. The technique is based on the maximum principle. The experimental part of the investigation consists in measuring reactivity of the reactor operated on a dayly cycle with overnight outages. The results have shown, that the point reactor model accounting for spatial effects can be used to describe xenon transients in the IRT-2000 type reactors. The experiments have proved the validity of the calculations. The technique developed reduces the duration of forced outages due to xenon overpoisoning more than twice and is applicable not only to the IRT type reactors but to other reactors operating in a cyclic regime as well. (Atomindex citation 10:445784)

ITEF-44(1978) PC **A04**/MF **A01**
Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Teoreticheskoj i Ehksperimental'noj Fiziki.
Technique for Calculating the Controllability of a Nuclear Reactor with Respect to Spontaneous Power Oscillations.
T. S. Zaritskaya, and A. P. Rudik. 1978, 51p
In Russian.
U.S. Sales Only.

A new approach is put forward to calculate conditions of appearing spatial-time oscillations of nuclear reactor power. The behaviour of fluctuations in xenon-135 concentrations are analyzed in rather a short period of time following their appearance. The nuclear reactor stability criterion is formulated. The perturbation theory in the one-group approximation is used. It is pointed out that the method proposed is more profitable than the standard asymptotic approach, the estimations obtained being rather useful for practical operation of nuclear reactors. (Atomindex citation 10:445807)

ITEF-8(1978) PC **A03**/MF **A01**
Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Teoreticheskoj i Ehksperimental'noj Fiziki.
Optimization of Xenon Transients with Limited Rates of Reactor Power Variations.
A. S. Gerasimov. 1978, 46p
In Russian.
U.S. Sales Only.

The minimization problem of the xenon transient time is considered with the account of limitations put on the rate of power variations and xenon concentration at transients. The one-group point reactor model is used. A permitted regime is obtained that meets the boundary conditions as well as limitations imposed on the operation and phase variables. There is an optimum regime among the permitted ones. The optimality is reaffirmed by the maximum principle. The total increase of the transient duration as compared to the problem without limitations on the rate of power variations has proved to be less than the total duration of all the parts of the permitted regime with a maximum (by modulus) rate of power variations. (Atomindex citation 10:445785)

ITEF-9(1978) PC **A03**/MF **A01**
Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Teoreticheskoj i Ehksperimental'noj Fiziki.
Optimization of Xenon Transients for Limited Rates of Power Variation with the Account of Spatial Inhomogeneities.
A. S. Gerasimov. 1978, 27p
In Russian.
U.S. Sales Only.

An optimization method of xenon transients for limited values of xenon poisoning and power variations is developed with the account of spatial inhomogeneities of the fuel and neutron flux distributions. The time dependence of the neutron flux is assumed not to affect its spatial distribution. The account of the spatial inhomogeneities is performed by the method of spatial momenta. The solution of the general problem is reduced to the solution of several problems in the point models in the perturbation theory. Numerical solutions using the optimization method show that the iterations

converge well and already the zero approximation yields an adequate result. (Atomindex citation 10:437969)

Juel-Spez-4 PC **A06**/MF **A01**
Kernforschungsanlage Juelich G.m.b.H. (Germany, F.R.). Inst. fuer Reaktorentwicklung.
Lay-out and Construction of a Pressure Vessel Built-Up of Cast Steel Segments for a Pebble-Bed High Temperature Reactor with a Thermal Power of 3000 MW.
J. Voigt. Mar 78, 105p
In German.Thesis.
U.S. Sales Only.

The prestressed cast vessel is an alternative to the prestressed concrete vessel for big high temperature reactors. In this report different cast steel vessel concepts for an HTR for generation of current with 3000 MW(th) are compared concerning their realization and economy. The most favourable variant serves as a base for the lay-out of the single vessel components as cast steel segments, bracing, cooling and outer sealing. Hereby the actual available possibilities of production and transport are considered. For the concept worked out possibilities of inspection and repair are suggested. A comparison of costs with adequate propositions of the industry for a prestressed concrete and a cast iron pressure vessel investigates the economical competition. (Atomindex citation 10:421451)

Juel-Spez-5 PC **A07**/MF **A01**
Kernforschungsanlage Juelich G.m.b.H. (Germany, F.R.).
Status of High Temperature Reactor Development in the Federal Republic of Germany.
P. Engelmann. Feb 78, 144p
U.S. Sales Only.

The Swedish AB Atomenergi held a HTR Information Seminar in Stockholm on January 11, 1978. At this seminar the status of the High Temperature Reactor development program in the Federal Republic of Germany was presented in a series of papers. This report containing the papers in english language makes the information also available to other parties outside Germany who are interested in the HTR development. The papers deal with the German HTR-program, the experience from construction and operation of HTR-plants, the HTR-technology, especially the nuclear system and its application for power production and process heat, the nuclear coal gasification and nuclear long distance energy transport, the HTR fuel cycles, the safety of HTR plants and nuclear process heat plants, an economic evaluation of the HTR as a power plant and/or source of process heat and the introduction strategy of this reactor system in the FRG. The review represents the status at the beginning of 1978. (Atomindex citation 10:441845)

Juel-1466 PC **A05**/MF **A01**
Kernforschungsanlage Juelich G.m.b.H. (Germany, F.R.). Inst. fuer Nukleare Sicherheitsforschung.
Investigations of the Consequences of Hypothetical Accidents for High Temperature Reactors. II. Consequences Following a Breach of the Primary Circuit Together with Additional Failure of Active Engineered Safeguards (HSK 2).
J. Wolters, A. Badur, P. H. David, J. Fassbender, and R. Finken. Nov 77, 89p
In German.
U.S. Sales Only.

The consequences are analyzed for a hypothetical accident in a nuclear power plant with a gas cooled high temperature reactor having a thermal power of 3000 MW. The HTR-1160 is used as the basis for the investigation. As the initiating event a breach of the primary circuit is assumed with leak cross sections of up to 10 times the 'design leak size'. The initial pressure is taken as 50 bars. The breach of the primary circuit leads in the worst case to a pressure equilibrium between primary circuit and containment within 50 s. Design limits for pressure and temperature will not be exceeded thus justifying the assumption of containment integrity. (Atomindex citation 09:411881)

Juel-1490 PC **A07**/MF **A01**
Kernforschungsanlage Juelich G.m.b.H. (Germany, F.R.). Inst. fuer Reaktorwerkstoffe und Heisse Zellen.
Investigations of the Behaviour of Coated Fuel Particles and Spherical Fuel Elements at Accident Temperatures.
W. Schenk. May 78, 142p
In German.Thesis.
U.S. Sales Only.

A post irradiation annealing test apparature was constructed for the measurement of fission gas release at temperatures similar to those to be reached in a HTR during a hypothetical accident. From examinations with existing apparatures up to temperatures of 1800 exp 0 C results were available about the load capacity of coated particles as well as knowledges about fission gas release and defect behaviour. These results were used to plan a series of annealing tests with spherical fuel elements up to 2500 exp 0 C. It could be shown that the (U,Th)O sub 2 -particles with high burnup will fail during maximum core heat up of a HTR only after some hours at temperatures above 2400 exp 0 C. (Atomindex citation 09:418773)

Juel-1507 PC **A07**/MF **A01**
Kernforschungsanlage Juelich G.m.b.H. (Germany, F.R.). Inst. fuer Reaktorentwicklung.
Determination of Reactivity of Multiplying Systems Filled with Spherical HTGR-Fuel Elements Using Kinetic Methods with Regard to the Pulsed-Neutron Method.
V. Drueke. Jun 78, 134p
In German.Thesis.
U.S. Sales Only.

At three critical or subcritical facilities - two of them filled with spherical HTGR-fuel elements - the reactivity is determined using kinetic methods. Besides the inverskinetic method the applicability of the pulsed-neutron method is investigated. The experimental results using the pulsed-neutron method are compared partly with the inverskinetic method and partly with diffusion-calculations. It is shown, that in the HTGR the space dependence of the reactivity in radial direction is not remarkable in spite of the 'kinetic distortion'; on the contrary in axial direction - the direction of the external neutron source - space dependent reactivity worths are measured. The results of the pulsed-neutron methods of Sjoestrand and Simmons-King are rather good applicable in all configurations. For the method of Sjoestrand it is necessary to select the detector positions, whereas for Simmons-King the calculated life-time determines the results. Therefore it is proposed to compare calculated and measured decay constants of the prompt neutron field in future. (Atomindex citation 09:418469)

Juel-1513 PC **A07**/MF **A01**
Kernforschungsanlage Juelich G.m.b.H. (Germany, F.R.). Inst. fuer Reaktorentwicklung.
Investigations for the Mechanical and Nuclear Realisation of a Pressure-Vessel Built-Up of Cast-Steel-Segments for a High-Temperature Reactor with a Power of 3000 MWsub(Th).
H. W. Grebe. Jun 78, 131p
In German.Thesis.
U.S. Sales Only.

Presently for gas-cooled reactors prestressed concrete vessels made of prestressed concrete are inserted. An alternative to the prestressed concrete vessel is the prestressed cast-steel vessel, whose mechanical and nuclear realisation is investigated in this report. On the basis of defined interpretation criteria the dimensioning calculations for the necessary cast-steel and prestressed steel-segments are performed as well as voltage gradients and deformation status for different load situations are determined and practically represented, whereby a reactor with ring core is comparative confronted to a reactor with cylindrical core. In the nuclear part it is tested how far the prestressed cast-steel-vessel suffices as a biological shielding or how far problems are to be expected concerning neutron activation and integrated neutron radiation. Weak points are shown and solution proposals are made. (Atomindex citation 09:418748)

Juel-1517 PC **A03**/MF **A01**
Kernforschungsanlage Juelich G.m.b.H. (Germany, F.R.). Inst. fuer Nukleare Sicherheitsforschung.
Consequence Analyses of Hypothetical Accidents of High Temperature Gas-Cooled Reactors. Pt. 2/3. Fission Product Release from a High Temperature Reactor Core During Unlimited Core Heat-Up for the HTR-1160 as an Example.
A. Mueller, and A. Badur. Jun 78, 41p
In German.
U.S. Sales Only.

With regard to a hypothetical accident which is characterized by the rupture of the primary circuit and by the additional failure of active engineered safeguards, the fission product release resulting from the unlimited core heat-up is analyzed. The applied models are explained and the data base being used is documented. The generally conservative treatment yields pessimistic activity release rates into the containment. The results show in particular that spontaneous massive fission product release does not occur. The time-dependency of the activity release from the fuel elements, the primary circuit and at last from the containment leads to a time delay in the range of at least several hours, before the environmental radiation load is raised. Ultimately the maximum radiation load itself proves relatively favourable. (orig.) 891 HP. (Atomindex citation 10:430771)

Juel-1521 PC **A04**/MF **A01**
Kernforschungsanlage Juelich G.m.b.H. (Germany, F.R.). Inst. fuer Reaktorentwicklung.
Pebble-Bed HTR as a Net-Breeding Reactor System.
H. J. Ruetten, C. E. Lee, and E. Teuchert. Jul 78, 58p
U.S. Sales Only.

The most suitable way to achieve breeding in the Pebble-Bed HTR is the installment of a symbiotic prebreeder-breeder system. This report presents the parametric research on both the prebreeder and the netbreeder designs. An optimization of its fuel utilization leads to a lifetime-averaged breeding ratio of 1.00 in the breeding variant. This reference design is named 'netbreeder'. Detailed information is given about the nuclear, thermohydraulic and economic properties of the reference system. Its potential for fuel utilization is outlined in a comparison of its uranium-ore requirement with that of alternative reactor systems: Compared with a typical PWR and with a 'conventional' HTR (conversion ratio 0.71) the symbiotic prebreeder-netbreeder system is marked by a distinctly better fuel utilization. (Atomindex citation 09:418769)

Juel-1522 PC **A05**/MF **A01**
Kernforschungsanlage Juelich G.m.b.H. (Germany, F.R.).
Development of a Core Material Safety System for the THTR 300 Pebble Bed Reactor.
H. Engelhardt. May 78, 83p
In German.
U.S. Sales Only.

Summarising the safety concept for the THTR 300 envisages nine 'strategic points', of which three are 'key measurement points', corresponding to the spatial arrangement of the core materials. Corresponding to the definition of the term 'strategic point' according to the verification agreement, in testing plant parameters one obtains the necessary and sufficient information for carrying out safety measures together with information from all the strategic points. This information can easily be checked at the above mentioned points. First estimates of the extent of inspection for this plant according to the international safeguard guidelines give a considerably lower value than for the verification agreement (VA) for this type of plant (article 80 of the VA: 50 inspector mandays). The safety concept for the THTR 300 described here therefore fulfils the requirements made of a safeguard system: It effectively supplies the proof of non-abstraction of core material (article 28, VA) with an economic use of the available means of inspection (article 78, VA) and a reasonable effect on operation (article 5a, 5b VA). (orig./HP) 891 HP. (Atomindex citation 10:434020)

Juel-1529 PC **A03**/MF **A01**
Kernforschungsanlage Juelich G.m.b.H. (Germany, F.R.). Inst. fuer Reaktorbauelemente.
Influence of High Axial Pressure Gradients on the Behaviour of the Kohlestein Insulation.
P. Broeckerhoff. Aug 78, 49p

In German.
U.S. Sales Only.

It was the aim of this research to test the efficiency of the sealings subjected to high velocities or high axial pressure gradients. Furthermore it should be tested if the pressure gradients cause an additional heat transport through the pores of the material. The experiments have been carried out in the high pressure wind tunnel at pressures up to about 40 bars. To get high velocities a displacement body has been mounted. Maximum velocities of about 62 m/s and 45 m/s could be reached using helium or air, respectively. Helium temperatures of about 400 exp 0 C were achieved. The maximum air temperatures were restricted to 300 exp 0 C because of the corrosion of the kohlestein. After sealing the gaps the temperature distribution along and around the insulation was uniform. The temperature peaks observed at the fourth ring are the consquence of a recent crack. The thermal fluxes are independent of the pressure except at the highest velocity. They are lower than those of the previous tests. Furthermore the distribution of the fluxes is nearly uniform. (Atomindex citation 10:438031)

JAERI-M-7415 PC **A06**/MF **A01**
Japan Atomic Energy Research Inst., Tokyo.
Studies on Design Principles and Criteria of Fuels and Graphites for Experimental Multi-Purpose Very High Temperature Reactor.
T. Arai, S. Sato, and Y. Tani. Dec 77, 124p
In Japanese.
U.S. Sales Only.

Design principles and criteria of fuels and graphites have been studied to determine the main design parameters of a reference core MARK-III of the Experimental Multi-purpose Very High Temperature Reactor. The present status of research and development for HTGR fuels and graphites is reviewed from a standpoint of their integrity and safety aspects, and is compared to the specific design requirements for the VHTR fuels and graphites. Consequently, reasonable materials specifications, safety criteria and design analysis methods are presented for coated fuel particle, fuel compact, graphite sleeve, core support graphite and neutron absorber material. These design principles and criteria will be refined by further experimental investigations. (Atomindex citation 09:411862)

JAERI-M-7417 PC **A03**/MF **A01**
Japan Atomic Energy Research Inst., Tokyo.
Evaluation of Fission-Product Gases in Program GAPCON Series and FREG-3 to Estimate the Gap Heat Transfer Coefficient.
N. Ohki, Y. Harayama, T. Takeda, and F. Izumi. Dec 77, 30p
In Japanese.
U.S. Sales Only.

In safety evaluation of a fuel rod, estimation of the stored energy in the fuel rod is indispensable. For this estimation, the temperature distribution in the fuel rod is calculated. Most important in determination of the temperature distribution is the gap heat transfer coefficient (gap conductance) between pellet surface and cladding inner surface. Under fuel rod operating condition, the mixed gas in the gap is composed of He, Xe and Kr. He is initial sealed gas. Xe and Kr are fission-product gases, of which the quantities depend on the fuel burn-up. In program GAPCON series (GAPCON and GAPCON-THERMAL-1 and -2) and FREG-3, these quantities are given as a function of the irradiation time, power rating and neutron flux in estimation of the thermal conductivity of the mixed gas. The methods of calculating the quantities of Xe and Kr in the programs have been examined. Input of the neutron flux which influences F.P. gas production rates is better than the determination from the fuel-rod power rating. (Atomindex citation 09:412265)

JAERI-M-7459 PC **A03**/MF **A01**
Japan Atomic Energy Research Inst., Tokyo.
In-Service Inspection of OGL-1. Inspection Ideas and Results of In-Pile Tube Pre-Service Inspection.
K. Nakamura, and K. Ohoka. Jan 78, 36p
In Japanese.
U.S. Sales Only.

OGL-1 is the first high temperature in-pile gas loop in Japan for VHTR fuel development. It was installed in the Japan Materials Testing Reactor in October 1976, and the first irradiation test of coated-particle dispersion fuel has been successfully performed at average specimen-outlet gas temperature 1832 exp 0 F. Since it is operated under very high coolant temperature and pressure, special structural design methods were applied to the loop components. In-service inspection is extremely important to ensure integrity of the components. Fundamental ideas of the inspection and results of the pre-service inspection on an in-pile tube, one of the critical design components of the loop because of the severe operating conditions, are described. (Atomindex citation 09:411984)

JAERI-M-7484 PC **A02**/MF **A01**
Japan Atomic Energy Research Inst., Tokyo.
Modification of JRR-2.
Y. Miyasaka. Jan 78, 25p
U.S. Sales Only.

This report gives an outline of some of the main modifications carried out around the Reactor Core on the Research Reactor JRR-2, at the Tokai Research Establishment of JAERI. The JRR-2 was shut down in December 1973, to improve it in heavy water leakage from the metal packing between core tank and support ring, corrosion of the lower shielding plug, and fault in the control-rod mechanism. Main modifications were a standing seal weld at the support ring to stop heavy water leakage, replacement of the reactor top shield and improvement of the helium system. The control-rod assemblies and the refueling devices were replaced by the newly designed ones also. In addition to the modification plan, the irradiated air exhaust system was improved to reduce radioactive argon gas release through the stack. Works were completed successfully in September 1975. But a light water leakage occurred at the stand pipe below the light water tank on November 11, 1975, which was repaired in about 4 months. (Atomindex citation 09:411972)

JAERI-M-7503 PC **A02**/MF **A01**
Japan Atomic Energy Research Inst., Tokyo.
Fuel Pin Behavior During UO sub 2 Pellet Melting.
K. Yanagisawa. Jan 78, 10p
U.S. Sales Only.

Fuel pin behavior with heat rating up to UO sub 2 melting was investigated by means of power cycling capsule of JMTR (Japan Materials Testing Reactor). The fuel pin was subjected to power irradiation examination for metallographic study. Results are: (1) UO sub 2 pellet melting occurred at 630 W/cm and the molten UO sub 2 spread cylindrically in one-third the bulk of specimen. (2) A typical cross sectional ceramography revealed that grain boundaries were not observed at the central part and non-equiaxial and equiaxial grains were observed at middle and outer parts. (3) Pores were mostly on the grain boundaries, few in the grains. (4) Cracks in the pellet were transgranular. (Atomindex citation 09:411740)

JAERI-M-7554 PC **A08**/MF **A01**
Japan Atomic Energy Research Inst., Tokyo.
Quarterly Progress Report on the NSRR Experiments. V. July to December 1977.
M. Ishikawa, K. Tomii, T. Hoshi, N. Onishi, and S. Saito. Mar 78, 169p
In Japanese.
U.S. Sales Only.

Studies of fuel behavior under simulated Reactivity Initiated Accident (RIA) conditions in NSRR have proceeded since October 1975. The results from July to December 1977 are described at the following tests: standard fuel, pre-pressurized rod, gap parameter, flow area simulation, rod bundle, water-logged rod, stainless-steel-cladding rod, fretting-corroded rod. (Atomindex citation 10:438098)

JAERI-M-7565 PC **A05**/MF **A01**
Japan Atomic Energy Research Inst., Tokyo.
Studies on a Thermal Insulation Layer in the High Pressure, High Temperature Gas. I. Discussions of the Natural Convective Heat Transfer in the Thermal Insulation Layers and Experimental Apparatus.
H. Shimomura. Mar 78, 78p
In Japanese.
U.S. Sales Only.

Basic equations of heat transfer in a thermal insulation layers are presented in the high pressure, high temperature gas atmosphere. Natural convective heat transfer in the packed beds is then studied. Further described are experiments plans and principal particulars of experimental apparatus based on the above discussions. (Atomindex citation 10:430772)

JAERI-M-7566 PC **A03**/MF **A01**
Japan Atomic Energy Research Inst., Tokyo.
Studies on a Thermal Insulation Layer in the High Pressure, High Temperature Gas. II. Heat Transfer Analysis in the Horizontal Annular Insulation Layer.
H. Shimomura. Mar 78, 29p
In Japanese.
U.S. Sales Only.

Thermal insulation problems in HTGR technology and natural convective heat transfer in a horizontal annular thermal insulation layer important in VHTR piping are studied. The product of Rayleigh number Ra and Darcy number Da, (RaDa) and the ratio of outer and inner radii of the annular layer (r sub(o)/r sub(i)) are governing parameters of the mean heat transfer characteristics. From numerical analysis, the relative increase of mean effective thermal conductivity (lambda sub(e)/lambda) is formulated as: (lambda sub(e)/lambda) sub(m) = 0.168 (r sub(o)/r sub(i) - 0.924)sup(1/2), 1.25 <= r sub(o)/r sub(i) <= 3, (lambda sub(e)/lambda) >= 1. In the region of (lambda sub(e)/lambda) sub(m) >= 1, the amplitude of local heat flux and the effective conductivity at inner and outer boundaries increase notably with increase of the product of Rayleigh number and Darcy number RaDa. Therefore, thermal design of the annular insulation with conduction model will be insufficient. (Atomindex citation 10:438046)

JAERI-M-7579 PC **A04**/MF **A01**
Japan Atomic Energy Research Inst., Tokyo.
Measurement of FP Plate-out Using a Portable Ge(Li) Detector. Preliminary Measurement of FP Plate-out with OGL-1.
M. Katagiri, H. Terada, and H. Takahashi. Mar 78, 63p
In Japanese.
U.S. Sales Only.

In safety analysis of a multi-purpose high-temperature gas cooled reactor, it is important to evaluate the amount of fission product (FP) plate-out in piping and machinery of the primary circuit. Germanium spectroscopy of gamma-rays due to the plate-out appears to be useful. Preliminary measurement of FP plate-out was made preceding the FP plate-out measurement project with high-temperature gas loop OGL-1. The purpose was to confirm effectiveness of the method and reveal technical problems. Upon termination of 39th cycle and 40th cycle of JMTR operation, using a portable Ge(Li) detector and lead collimator, an in-pile tube, three high-temperature pipes, a regenerative heat exchanger and a filter in the OGL-1 were measured. Plate-out nuclide exp 131 I, exp 133 I, exp 95 Zr, exp 95 Nb, exp 99 Mo, exp 60 Co, exp 58 Co, exp 51 Cr, exp 54 Mn, exp 65 Zn, exp 59 Fe, sup(110m)Ag, exp 122 Sb, exp 124 Sb, exp 182 Ta, exp 140 La, exp 46 Sc, exp 181 Hf, exp 24 Na and exp 137 Cs could be identified, with concentrations of 10 exp -5 mu Ci/cm exp 2 -- 10 exp -2 mu Ci/cm exp 2 . The method was found to be effective, and useful results could be obtained for the FP plate-out measurement project. (Atomindex citation 10:430918)

JAERI-M-7580 PC **A04**/MF **A01**
Japan Atomic Energy Research Inst., Tokyo.
Identification Experiments in JPDR-II Dynamics Application of Autoregressive Modeling.
M. Kitamura, R. Oguma, and K. Matsubara. Mar 78, 55p
In Japanese.
U.S. Sales Only.

A practical identification method has been studied experimentally for estimation of dynamics of nuclear power plants. In this method, time series data of process variables from a nuclear power plant are fitted to a multivariate autoregressive (AR) model. The optimal model parameters are determined by

minimizing criterion Final Prediction Error (FPE) and solving the Yule-Walker equations. Pseudo-random binary sequences were applied to the JPDR-II plant of power 45MWt and 17 variables were observed. AR model fitting was made to the observed data for dynamic analysis. Feasibility of this method was confirmed by physically examining the identified dynamic response functions. Uncertain parameters in a theoretical dynamics model could be estimated successfully by comparing with the AR model obtained, indicating usefulness of the method. (Atomindex citation 10:437900)

JAERI-M-7583 PC **A03**/MF **A01**
Japan Atomic Energy Research Inst., Tokyo.
Computer Code for the Analysis of Destructive Pressure Generation Process During a Fuel Failure Accident, PULSE-2.
T. Fujishiro. Mar 78, 39p
In Japanese.
U.S. Sales Only.

The computer code PULSE-2 has been developed for the analysis of pressure pulse generation process when hot fuel particles come into contact with the coolant in a fuel rod failure accident. In the program, it is assumed that hot fuel fragments mix with the coolant instantly and homogeneously in the failure region. Then, the rapid vaporization of the coolant and transient pressure rise in failure region, and the movement of ejected coolant slugs are calculated. The effect of a fuel-particle size distribution is taken into consideration. Heat conduction in the fuel particles and heat transfer at fuel-coolant interface are calculated. Temperature, pressure and void fraction in the mixed region are calculated from the average enthalpy. With physical property subroutines for liquid sodium and water, the model is usable for both LMFBR and LWR conditions. (Atomindex citation 10:438418)

JAERI-M-7608 PC **A06**/MF **A01**
Japan Atomic Energy Research Inst., Tokyo.
Studies on Heterogeneity Effects in Gas-Cooled Fast Reactor.
T. Osugi, H. Yoshida, and F. Ohta. Mar 78, 110p
In Japanese.
U.S. Sales Only.

Heterogeneity effect in a gas-cooled fast reactor (GCFR) of power 1000 MWe, with helium-cooled pin type fuel, has been studied. Reactor characteristics (criticality, neutron spectrum, neutron flux distribution, power distribution, doppler reactivity effect, helium-void effect and steam ingress reactivity effect) are calculated at each burn-up step (T = 0, 1, 2 yr) with homogeneous and heterogeneous reactor constants. Cell calculation is made by collision probability method, and directional diffusion constants are based on Benoist's formula. Heterogeneity effect of in 300 MWe GCFR was also studied for comparison. Following are the results. (1) Heterogeneity effect on the criticality (multiplication factor) is -0.46% delta k/k. It decreases with burn-up. (2) Heterogeneity effect on the steam ingress reactivity effect varies with ingress steam density; 0.05% delta k/k for 0.01 g/cc, 0.12 for 0.03 and 0.14 for 0.05. It increases slightly with burn-up. (3) Heterogeneity effects on other reactor characteristics are insignificant. (4) Heterogeneity effects in 300 MWe GCFR are not much different from those in 1000 MWe GCFR. (Atomindex citation 10:438072)

JAERI-M-7609 PC **A03**/MF **A01**
Japan Atomic Energy Research Inst., Tokyo.
Analysis of Steam Entry Reactivity Worth Experiments in the Gas-Cooled Fast Reactor.
S. Iijima, and H. Yoshida. Mar 78, 28p
In Japanese.
U.S. Sales Only.

The steam entry reactivity effect on gas-cooled fast reactor is one of the most important safety-related physic parameters as is the sodium void reactivity effect in LMFBR. Steam entry reactivity worth experiments in a prototype GCFR were analysed to examine reliability of the fast reactor group constant set and computation codes used in design studies of LMFBR and GCFR. The experiments were made in the ZPR-9, Phase-I and Phase-II assemblies at ANL as one of the benchmark reactor physics experiments for the 300 MWe GCFR demonstration plant in the U.S. Analysis of the experiments is based on two-dimensional R-Z diffusion approximation with unisotropic diffusion coefficients and JAERI-FAST 25-group cross section set. Calculated results underestimate the relatively large positive values of measured steam entry reactivity worth. This is because the calculation is not able to consider the neutron spectrum softening due to ingression of steam into the core. In order to solve the large difference between experiment and calculation, therefore detail studies are necessary on cross section of nuclides and the calculation methods including transport theory. (Atomindex citation 10:430802)

JAERI-M-7617 PC **A07**/MF **A01**
Japan Atomic Energy Research Inst., Tokyo.
Modification of the Heavy-Water Tank Seal and Reactor Top Shield in JRR-2.
M. Banba, Y. Miyasaka, S. Yamaguchi, and K. Shimizu. May 78, 145p
In Japanese.
U.S. Sales Only.

This report describes installation of a standing seal by welding to stop heavy water leakage in heavy-water tank and replacement of the reactor top shield, in research reactor jRR-2 (heavy water moderated and cooled, 10 MW thermal, and 2 x 10 exp 14 n/cm exp 2 sec peak thermal neutron flux). The puspose was to eliminate reactor operational problems, lower shielding plug corrosion and heavy water leakage and also to reduce tritium release and to improve vertical experimental facilities. Works were started in January 1974 following out-pile mock-up tests, and completed in September 1975. Radioactivities around the work area due to 13 years reactor operation were tritium concentration about 900 mu Ci/cm exp 3 in the heavy water and maximum surface dose rate about 5 R/h near the welding work area. Personnel exposure was strictly controlled with shielding and protective equipment to attain maximum personal safety. Maximum and average exposure dose rates were 230 mrem/man and 83 mrem/man respectively, which are about one half of the planned levels. Modifications were satisfactory in view of 5,000 hours reactor operation and the functional test results. The schedule, out-pile-tests, removal of radioactive components, installation works, functional tests and operation results, which are described, should be significant for future references. (Atomindex citation 10:438088)

JAERI-M-7632 PC **A04**/MF **A01**
Japan Atomic Energy Research Inst., Tokyo.
Study of the Modifications of Nuclear Instrumentation Systems for JRR-2.
M. Azim, O. Horiki, and M. Sato. Apr 78, 73p
U.S. Sales Only.

In this report a comparative study has been carried out between the original A.M.F. design and the modified design for the nuclear instrumentation systems of the Research Reactor JRR-2, at the Tokai Research Establishment of JAERI. Due to a fire accident in the control room, in July 1968, the originally designed nuclear instrumentation systems, using conventional vacuum tube circuits, were destroyed and were replaced by the modified design, incorporating solid state linear integrated circuits as basic circuit components. The results of the reactor instrumentation systems modification at JRR-2 are very encouraging as the operating efficiency of the Reactor registered an improvement of 43%. Moreover the safety aspects have been fully taken care of in the new design and the reactor is well guarded against all possible instrument failures and human errors. This report presents the basic theory of operation of the two designs alongwith a comparative safety analysis. (Atomindex citation 10:437968)

JAERI-M-7634 PC **A02**/MF **A01**
Japan Atomic Energy Research Inst., Tokyo.
Measurement of Fuel Pin Deformation under Cyclic Power Operation. Preliminary Experiment.
K. Yanagisawa, I. Takeshita, and T. Saito. Apr 78, 23p
U.S. Sales Only.

The result of preliminary experiment on fuel pin deformation under cyclic power operation are described. (1) A slight rod flattering of 30 mu m is observed in surface profilometry. (2) Diametral contraction is 10 mu m. (3) Increasement of temperature during constant power made 0.03mm length change (in appearance) to the rod. (4) In the last stage of cyclic power operation elongation is 120 mu m at low power level and 80 mu m (both in appearance) at high power level. Deformation pattern is similar between low and high power levels. (5) By metallographic observation, cracks are not parallel to the axial direction. Those reaching to pellet-pellet boundary are random in direction. Observed crack has branched. (Atomindex citation 10:445778)

JAERI-M-7638 PC **A06**/MF **A01**
Japan Atomic Energy Research Inst., Tokyo.
Guidelines for Inservice Inspection of Component in Experimental Multi-Purpose Very High Temperature Gas-Cooled Reactor Plant.
K. Ooka, S. Muraoka, M. Ezaki, and T. Kodaira. May 78, 108p
In Japanese.
U.S. Sales Only.

The guidelines for structural design of experimental multi-purpose very high temperature gas-cooled reactor (EX-VHTGR) specify the guidelines for quality assurance of materials and welds during fabrication and construction, and inservice inspection to obtain integrity of the structures. The guidelines for inservice inspection are presented, which considers Nuclear Safety Criteria for the Design of Stationary Gas Cooled Reactor Plants, Guidelines for the Structural design of EX-VHTGR at Elevated Temperature Service, ASME Boiler and Pressure Vessel code sec. XI, specifications of EX-VHTGR's system construction. Covered are inspection intervals, areas for examination, extents of examination, examination methodes, examination results evaluation, etc. in three classes of components according to safety nature. (Atomindex citation 10:438041)

JAERI-M-7683 PC **A05**/MF **A01**
Japan Atomic Energy Research Inst., Tokyo.
Present Status of Fuel Motion Detection by Radiation.
K. Sumita, H. Mizuta, M. Ishizuka, K. Ara, and H. Nakata. May 78, 97p
In Japanese.
U.S. Sales Only.

In reactor safety research, it is important to know transient fuel behavior under accidental conditions. Transient histories such as temperature and axial expansion of fuel and cladding and internal pressure of fuel rod are thus measured in experiments simulating accidents. If fuel motion could then be observed during and after fuel failure, this would greatly make for fuel behavior research. The present status is reviewed of fuel motion detections by radiations such as neutron, gamma -ray and X-ray, including the principle and system. A neutron hodoscope among them is used already with practical results in in-reactor safety experiments of sodium-cooled fast breeder reactor. So, this is described in detail and its conceptual design as applied to the NSRR is presented. (Atomindex citation 10:445775)

JAERI-M-7727 PC **A03**/MF **A01**
Japan Atomic Energy Research Inst., Tokyo.
One Stacked-Column Vibration Test and Analysis for VHTR Core.
T. Ikushima, H. Ishizuka, A. Ide, H. Hayakawa, and K. Shingai. Jul 78, 30p
U.S. Sales Only.

This paper describes experimental results of the vibration test on a single stacked-column and compares them with the analytical results. A 1/2 scale model of the core element of a very high temperature gas-cooled reactor (VHTR) was set on a shaking table. Sinusoidal waves, response time history waves, beat wave and step wave of input acceleration 100 - 900 gal in the frequency of 0.5 to 15 Hz were used to vibrate the table horizontally. Results are as follows: (1) The column has a non-linear resonance and exhibits a hysteresis response with jump points. (2) The column vibration characteristics is similar to that of the finite beams connected with non-linear soft spring. (3) The column resonance frequency decreases with increasing input acceleration. (4) The impact force increases with increasing input acceleration and boundary gap width. (5) Good correlation in vibration behavior of

the stacked-column and impact force on the boundary between test and analysis was obtained. (Atomindex citation 10:438049)

JAERI-M-7745 PC **A04**/MF **A01**
Japan Atomic Energy Research Inst., Tokyo.
Power Distribution Characteristics of Experimental Multi-Purpose Very High Temperature Gas Cooled Reactor. Distortions of the Local Power Distribution in the Fuel Lattices of Internally-Cooled Pin Type and Multi-Hole Type.
T. Doi. Jul 78, 56p
In Japanese.
U.S. Sales Only.

The local power distributions in a unit flow control region with and without a pair of control rods were analyzed for back-up cores of the Experimental Multi-Purpose Very High Temperature Gas Cooled Reactor by use of the point lattice burn-up code DELIGHT-IV and the two-dimensional transport code TWOTRAN-II. The following were revealed: (1) In modeling the cross section of a control rod by square shape, the equi-surface model is desirable for evaluation of multiplication constants and the equi-volume model for evaluation of power distributions. (2) A homogeneous model of the fuel elements is conservative in core design compared with the heterogeneous one, because of the underestimation of a control rod worth and the overestimation of a local power peaking. (3) The diffusion model estimates the control rod worth accurately with mean cross sections of the fuel elements and control rods. (Atomindex citation 10:445705)

JAERI-M-7796 PC **A05**/MF **A01**
Japan Atomic Energy Research Inst., Tokyo.
Fuel Centerline Temperature Measurements in NSRR Experiment.
T. Hoshi, T. Iwamura, S. Yanagihara, Y. Orita, and T. Hosokawa. Aug 78, 85p
In Japanese.
U.S. Sales Only.

The fuel centerline temperatures of NSRR standard fuel rods in pulse irradiations were measured with W-5% Re/W-26% Re thermocouples inserted in a centerline hole of the fuel pellets. Three different fuel rods were individually subjected to repeated energy deposition (4 -- 6 times) in 36 -- 242 cal/g.UO sub 2 . The maximum fuel temperatures under the same irradiation conditions were same; there was no significant effect of the irradiation repetition. The behavior of fuel temperature during cooling was governed by the cladding surface heat transfer coefficient. Beyond DNB, the behavior of cladding surface temperature was influenced by the irradiation repetition. However, the threshold of fuel failure was not influenced by the irradiation repetition. (Atomindex citation 10:445968)

JAERI-M-7807 PC **A04**/MF **A01**
Japan Atomic Energy Research Inst., Tokyo.
Densification of Uranium Dioxide Fuel Pellets, (2).
K. Yanagisawa. Aug 78, 66p
In Japanese.
U.S. Sales Only.

Analytical results in UO sub 2 fuel densification experiments are described as part of the irradiation behavior study on reactor fuel assemblies. The parameters are irradiation conditions, pellet fabrication conditions such as pellet initial density, initial grain size, pore size and pore distribution, and compressive axial force onto the pellet. (1) Densification is saturated at burnup about 4 -- 8 GWd/tUO sub 2 . Densification is little influenced by the linear heat rating. (2) Pellets sintered with low temperature trends to densify with ease. There is not such correlation between the pellet initial density and the densification but the low initial density pellet trends to densify readily. There is comparatively good correlation between the initial grain size and the densification, and the pellets with grain size over 10 mu m show little densification. Densification is strongly influenced by the pore distribution. The addition of a pore stabilizer (pore former) is effective in decreasing the densification. The pellet densified most shows no inner-granular pores in post-irradiation examination. Most densified pellets arise from high initial density, low sintering temperature and small grain size, whereas least densified ones from low density, low sintering temperature and small grain size. Grain growth is remarkable in out-pile resintering, and little in in-reactor. The tendency of in-reactor densification is similar to that of out-pile. (3) Densification is little influenced by the axial compressive force. (4) Based on the above results, a GPE (Initial Grain-initial Pore Estimation) method is proposed for estimating the in-reactor maximum densification of stable UO sub 2 fuels. (Atomindex citation 10:445777)

JINR-13-11147 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Neutron Physics.
Logic of the IBR-30 Pulsed Fast Reactor Control and Protection During Start-Up.
V. T. Rudenko, B. N. Solov'ev, and V. G. Tishin. 1978, 16p
In Russian.
U.S. Sales Only.

A technique is described for determining and controlling the IBR-30 reactivity during start-up. In solving the reactor kinetics equation reactivity is related to amplitude, duration and energy parameters of the power pulses. Relationships are presented for experimental determination of the effective delayed neutron share, as well as for calibration of the neutron intensity and average power in the subcritical regime. The scheme of the start-up system is presented. The preconditions are formulated to produce a control-signal triggering the early alarm system or the scram rod drop system followitng an emergency reactivity insertion. The IBR-30 operating experience has proved reliability and stability of the start-up system. (Atomindex citation 10:445975)

JINR-3-11550 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Neutron Physics.
Thermomechanical Analysis of the IBR-2 Pulse Reactor Fuel Pin.
V. L. Lomidze, and V. V. Melikhov. 1978, 17p
In Russian.
U.S. Sales Only.

The problem of time-dependent temperature distribution in the fuel pin of a fast pulse reactor is considered. The thermomechanical stresses in fuel pin cladding are calculated with the addition of some aspects which have not been taken into consideration in earlier investigations of thermal shocks (the hydraulic pressure of the fuel itself and gaseous fission products, temperature dependence of thermal parameters, etc.). The procedure of numerical solution of heat transfer and thermoelasticity equations includes axial effects of inertia. It is shown that for 5 Hz and 4 MW operational regime pulsations of the sodium temperature and thermal stresses in the blanket are small: 0.2 K and 0.44 kg/mm exp 2 . The amplitude of axial stresses of inertia in the blanket rises to 3.75 kg/mm exp 2 , and tangential ones to 10.8 kg/mm exp 2 . (Atomindex citation 10:441888)

JINR-3-11551 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Neutron Physics.
Experimental Investigation of the Thermal Shock Effects in the IBR-2 Fuel Element.
V. L. Lomidze, V. V. Melikhov, A. D. Rogov, and E. P. Shabalin. 1978, 17p
In Russian.
U.S. Sales Only.

The results of the experimental investigation of thermal shock mechanical effects in IBR-2 fuel elements are presented. The height of upper fuel pellet jumping due to the fast (about 100 Ms) increase of fuel temperature (up to 25 K) and thermomechanical stresses in the fuel pin cladding are measured. There is a great disagreement between experimental and theoretical results. The height on which the upper pellet jumps is 1.4 mm, if the temperature rise is 25 K. This result corresponds to the requirement for longitudinal wave propagation to be of the order of 1000 m/s. For qualitative explanation of it a model of the thermal shock in the fuel pin, consisting of pellets, is proposed. The model was tested experimentally. The velocity of mechanical signal propagation along the column of pellets was measured directly. The results agree with thermal shock experimental data. (Atomindex citation 10:441751)

KFA-AKI-IB-1/77 PC **A09**/MF **A01**
Kernforschungsanlage Juelich G.m.b.H. (Germany, F.R.). Arbeitsgruppe Kernenergie-Information.
Nuclear Energy from the Point of View of the Population. Analysis of Attitudes and Motives.
O. Renn. Dec 77, 200p
In German.
U.S. Sales Only.

The present study refers mainly to an empirical attitude investigation carried out in 1975 and 1976 in a suburb of Cologne. In order to remain up-to-date, new research results have been included in the analysis. The aim of the publication at hand is to deal with the nuclear controversy in its sociological and social-psychological dimensions, and also to elucidate motives and reasons behind the protests against nuclear energy. The report has been written for sociologists, nuclear engineers and scientists, journalists, political decision-finding authorities and interested laymen alike, and is to offer a general orientation in contradicting statements as regards the stance of the population. The central statement of this very detailed investigation is, that the population has a mainly positive attitude towards the construction of a nuclear power plant - even when antipathy and uneasiness towards a new energy source prevent emotional identification. (Atomindex citation 09:414687)

KFK-EXT-15/78-1 PC **A06**/MF **A01**
Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Abt. Reaktorbetrieb und Technik.
Operation and Utilization of the FR2 in 1977. Abbreviated Version.
J. Bluemle. Jun 78, 104p
In German.
U.S. Sales Only.

In its twelfth year of operation after the increase in power to 44 MW, the FR2 reactor again was operated at that design power according to schedule. The utilization of the reactor time at full power relative to the scheduled period of full power operation was 88% in 1977, the power output was 10,066 MWd. There were no major difficulties affecting reactor operation. Use of the reactor for experimental purposes again was good. Isotope production including irradiation of silicon for doping purposes for the production of semiconductors reached the level of the previous year. The production of fission product molybdenum medicine has shown a promising start. 20 experiments in the research areas of nuclear solid state physics and structural analysis (neutron diffraction) are attached to the beamhole outlets, some of them operated in the beamhole sharing mode. Up to 8 instrumented fuel capsule rigs and 3 pre-irradiation rigs were simultaneously loaded in the reactor core within the framework of the LWR Safety Program. Operation of the four large scale loop experiments proceeded according to schedule. While the superheated steam high pressure loop is becoming more and more important for purposes of the LWR safety program, the pressurized helium gas loop previously used for the Fast Breeder Project was decommissioned on May 2, 1977. In the way of this decommissioning also the thermionic converter, although still functioning, was removed after an unexpected in-pile time of some 31.800 hours of operation (N > 43 MW). The neutron radiography system was used for 176 pictures of test specimens, capsule rigs and biological material in the year under review. The gamma -in-pile rig was used to capacity, holding 35 samples examined to study the radiation resistance of various materials. 24 argon samples were extracted from the gas activation system for a program of measuring two-phase flows. (Atomindex citation 09:414972)

KFK-2617 PC **A05**/MF **A01**
Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.).
Turbulent Flow Through a Wall Subchannel of a Rod Bundle.
K. Rehme. Apr 78, 92p
In German.
U.S. Sales Only.

The turbulent flow through a wall subchannel of a rod bundle was investigated experimentally by means of hotwires und Pitot-tubes. The aim of this investigation was to get experimental information on the transport properties of turbulent flow espe-

cially on the momentum transport. Detailed data were measured of the distributions of the time-mean velocity, the turbulence intensities and, hence the kinetic of turbulence, of the shear stresses in the directions normal and parallel to the walls, and of the wall shear stresses. The pitch-to-diameter ratio of the rods equal to the wall-to-diameter ratio was 1.15, the Reynolds number of this investigation was Re = 1.23.10 exp 5 . On the basis of the measurements the eddy viscosities normal and parallel to the walls were calculated. The eddy viscosities observed showed a considerable deviation from the data known up-to-now and from the assumptions introduced in the codes. (Atomindex citation 09:418249)

KFK-2663 PC **A08**/MF **A01**
Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Inst. fuer Neutronenphysik und Reaktortechnik.
SAGAPO-2 - an Improved Version of the SAGAPO Code for the Thermofluiddynamic Analysis of Gas Cooled Fuel Element Bundles.
A. Martelli. Jul 78, 168p EUR-5753e
U.S. Sales Only.

The SAGAPO code, developed at the Karlsruhe Nuclear Center, was improved at General Atomic Company in San Diego, California (USA). The modifications introduced at General Atomic are summarized in this paper. Furthermore, the meaning of the new variables defined in COMMON BLOCKS is also explained. A complete listing of the new version of the code is included in the Appendix. Finally, the results of a parametric study performed at General Atomic with SAGAPO are summarized in this paper. (orig.) 891 GL. (Atomindex citation 10:433406)

KFK-2697 PC **A02**/MF **A01**
Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Inst. fuer Neutronenphysik und Reaktortechnik.
Pressure Drop of Spacer Grids in Rod Bundles of 12 Rods with Smooth and Roughened Surfaces.
K. Rehme. Oct 78, 24p
U.S. Sales Only.

Experiments have been performed on the pressure drop of spacer grids in rod bundles of 12 rods. Both a smooth and a rough rod bundle was used in the experiments. The artificial roughness cut into the outer surface of the rods was chosen such as to meet the actual design of a gas cooled fast breeder reactor. The results of this investigation for a Reynolds number range between Re=4.10 exp 3 and 7.10 exp 4 indicate that the pressure drop at the spacer grids is higher in a roughened rod bundle than in a smooth rod bundle. (Atomindex citation 10:441601)

KFKI-1977-83 PC **A03**/MF **A01**
Kozponti Fizikai Kutato Intezet, Budapest (Hungary).
TIBSO - A Program System for the Calculation of the Production, Transfer, Life Cycle and Radiation of Radionuclides in a Compound Nuclear Reactor System.
P. Vertes. Oct 77, 26p
U.S. Sales Only.

The goal of the program system TIBSO is the calculation of production, transfer, cumulation and filtration of radio isotopes in the cooling system of an atomic power plant. There is no restriction on the complexity of the cooling system, only the linearity and the time independence of technological parameters are assumed. The report contains the description of the basic idea of the method, the solution of the set of linear equations to be used and the description of the internal library files developed. (Atomindex citation 10:438437)

KFKI-1977-97 PC **A02**/MF **A01**
Kozponti Fizikai Kutato Intezet, Budapest (Hungary).
COBRA - 3C/KFKI: a Digital Computer Program for Steady and Transient Thermal-Hydraulic Analysis of Rod Bundle Nuclear Fuel Elements.
J. Vigassy, and L. M. Kovacs. Nov 77, 21p
U.S. Sales Only.

COBRA-3C/KFKI is a digital computer program for the CDC-3300 computer in FORTRAN language. The program is a revised version of the original COBRA-3C code. The code calculates steady-state and transient flow and enthalpy transport in rod-bundle nuclear fuel elements in both boiling and nonboiling conditions. The mathematical model is formulated by dividing the bundle flow area into flow subchannels that are assumed to contain one-dimensional flow and are coupled to each other by turbulent and diversion crossflow mixing. The program neglects sonic velocity propagation but allows for a temporal and spatial acceleration of the diversion crossflow in the transverse momentum equation. A semiexplicit finite-difference scheme is used to perform a boundary-value solution where the boundary conditions are the inlet enthalpy, inlet flow rate and exit pressure. (Atomindex citation 10:438438)

LA-UR-79-2686 PC **A02**/MF **A01**
Centre d'Etude de l'Energie Nucleaire, Mol (Belgium).
Measurement of the Neutron Spectrum of the Big Ten Critical Assembly by Lithium-6 Spectrometry.
G. De Leeuw-Gierts, S. De Leeuw, G. E. Hansen, and H. H. Helmick. 1979, 6p CONF-791051-4
Contract W-7405-ENG-36
ASTM-EURATOM symposium on reactor dosimetry, Ispra, Italy, 1 Oct 1979.

The central neutron-flux spectrum of the Los Alamos Scientific Laboratory's critical assembly, Big Ten, was measured with a exp 6 Li spectrometer and techniques developed at the Centre d'Etude de L'Energie Nucleaire, Mol, as part of an experimental program to establish the characteristics of Big Ten. (ERA citation 05:008525)

LA-UR-79-3191 PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
Materials Accounting Considerations for International Safeguards in a Light-Water Reactor Fuels Reprocessing Plant.
E. A. Hakkila, D. D. Cobb, H. A. Dayem, R. J. Dietz, and E. A. Kern. 1979, 10p CONF-791117-8
Contract W-7405-ENG-36
ANS topical conference, Kiawah Island, SC, USA, 26 Nov 1979.

This paper summarizes the requirements and functions of materials measurement and accounting systems applicable to large (1500 metric tonnes heavy metal per year - MTHM/y) future reprocessing facilities as well as small (210 MTHM/y) plants that are presently under IAEA safeguards. The effectiveness of conventional and proposed improved measurement and accounting systems were compared using modeling, simulation, and analysis procedures. The study showed that conventional accountability can meet IAEA goal quantities and detection times in these reference facilities only for low-enriched uranium. Dynamic materials accounting may meet IAEA goals for detecting abrupt (1-3 wks) diversion of 8 kg of plutonium. Current or projected techniques cannot meet the one-year protracted diversion goal for plutonium if this goal is based on an absolute 8 kg quantity. (ERA citation 05:008184)

LA-UR-79-3205 PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
Evolution of Safeguards Systems Design.
J. P. Shipley, E. L. Christensen, and R. J. Dietz. 1979, 8p CONF-791117-8
Contract W-7405-ENG-36
ANS topical conference, Kiawah Island, SC, USA, 26 Nov 1979.

Safeguards systems play a vital detection and deterrence role in current nonproliferation policy. These safeguards systems have developed over the past three decades through the evolution of three essential components: the safeguards/process interface, safeguards performance criteria, and the technology necessary to support effective safeguards. This paper discusses the background and history of this evolutionary process, its major developments and status, and the future direction of safeguards system design. (ERA citation 05:008185)

LA-UR-79-3276 PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
Building Control for Nuclear Materials R and D Facility.
O. Hart. 1979, 10p CONF-791218-2
Contract W-7405-ENG-36
Annual conference of the data general users group, New Orleans, LA, USA, 4 Dec 1979.

The new plutonium research and development facility at LASL was the first facility to be completed in the United States under the new environmental requirements. To insure that these new requirements are met, a redundant computer system is used to monitor and control the building. This paper describes the supervisory control and data acquisition system that was implemented to perform that function. (ERA citation 05:008968)

LA-7585-PR PC **A14**/MF **A01**
Los Alamos Scientific Lab., NM.
Theoretical Division Progress Report.
N. G. Cooper. Apr 79, 304p
Contract W-7405-ENG-36

This report presents highlights of activities in the Theoretical (T) Division from October 1976-January 1979. The report is divided into three parts. Part I presents an overview of the Division: its unique function at the Los Alamos Scientific Laboratory (LASL) and within the scientific community as a whole; the organization of personnel; the main areas of research; and a survey of recent T-Division initiatives. This overview is followed by a survey of the 13 groups within the Division, their main responsibilities, interests, and expertise, consulting activities, and recent scientific accomplisments. The remainder of the report, Parts II and III, is devoted to articles on selected research activities. Recent efforts on topics of immediate interest to energy and weapons programs at LASL and elsewhere are described in Part II, Major National Programs. Separate articles present T-Divison contributions to weapons research, reactor safety and reactor physics research, fusion research, laser isotope separation, and other energy research. Each article is a compilation of independent projects within T Division, all related to but addressing different aspects of the major program. Part III is organized by subject discipline, and describes recent scientific advances of fundamental interest. An introduction, defining the scope and general nature of T-Division efforts within a given discipline, is followed by articles on the research topics selected. The reporting is done by the scientists involved in the research, and an attempt is made to communicate to a general audience. Some data are given incidentally; more technical presentations of the research accomplished may be found among the 47 pages of references. 110 figures, 5 tables. (ERA citation 05:014451)

LA-8125-PR PC **A03**/MF **A01**
Los Alamos Scientific Lab., NM.
Nuclear Safeguards Research and Development. Progress Report, July-September 1979.
S. D. Gardner. Jan 80, 47p
Contract W-7405-ENG-36

This report presents the status of the Nuclear Safeguards Research and Development program pursued by the Los Alamos Scientific Laboratory Safeguards Groups Q-1, Q-2, Q-3, Q-4, and Q-5. Topics covered include nondestructive assay technology development and applications, international safeguards, perimeter safeguards and surveillance, concepts and subsystems development (e.g., DYMAC program), integrated safeguards systems, training courses, and technology transfer. (ERA citation 05:013185)

LA-8202-PR PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
Evaluation of In-Line Nondestructive Assay Systems. Progress Report, July 1-September 30, 1979.
D. F. Bowersox, N. Ensslin, S. T. Hsue, S. S. Johnson, and L. G. Speir. Jan 80, 17p
Contract W-7405-ENG-36

Specified instruments for in-line nondestructive assay of process streams in spent nuclear fuels will be tested under realistic conditions for use in effective process control and materials counting. Progress in this project from July 1 to September 30, 1979 is described. (ERA citation 05:011385)

ND-R-178(R) PC **A03**/MF **A01**
UKAEA Risley Nuclear Power Development Establishment (England).

Whole-Core Accidents in an LMFBR.
A. R. Baker. Nov 78, 28p
U.S. Sales Only.

The lecture presents an introduction to the evaluation of whole-core accidents in a liquid-metal cooled fast breeder reactor (LMFBR). These accidents can be sub-divided into two types: transient overpower accidents or transient under-cooling accidents, according as the power or coolant flow is substantially disturbed from normal values. There would only be serious consequences in the event of failure of the reactor's automatic protection system or, for a few less important hypothetical accidents, in the event of sudden and catastrophic failure of a major structure. The treatment of whole-core accidents in safety presentations to responsible authorities is briefly discussed and the possible courses of such accidents are outlined, showing the importance of the Doppler fuel temperature and sodium void coefficients. The calculational methods are described with illustrations from studies with the UK code FRAX. The lecture concludes with brief consideration of the experimental validation of computer codes and the design consequences of whole-core accident studies. (ERA citation 05:013601)

NIIEFA-A-0340 PC **A02**/MF **A01**
Nauchno-Issledovatel'skii Inst. Elektrofizicheskoi Apparatury, Leningrad (USSR).
Electromagnetic Pumps for Fast Reactors Primary Cooling Circuits.
A. M. Andreev, E. A. Bezgachev, B. G. Karasev, I. R. Kirillov, and A. P. Ogorodnikov. 1977, 24p
In Russian.
U.S. Sales Only.

The review of the electromagnetic pump development for the main loops of the powerful atomic energy stations with fast neutron reactors is presented. The calculation results of the cylindrical pump at the p essure of 9x10 exp 5 Pa nad Na consumption of 15500 m exp 3 /h are given. Its design is described, the comparison of three pump versions, differing by the coil cooling method: water, Na-K, nitrogen is considered. The design and insulating material choosing, cavitation aspects and pump electric power at emergency heating conditions are discussed. (Atomindex citation 09:414956)

NUREG/CR-1112 PC **A08**/MF **A01**
Sandia Labs., Albuquerque, NM.
Light Water Reactor Safety Research Program. Volume 12.
Quarterly rept. Apr-Jun 79,
Marshall Berman. May 80, 163p SAND-79-2057-VOL-12
See also NUREG/CR-1337.

This report summarizes the progress of the Light Water Reactor Safety Research Program during the 2nd quarter of 1979. Specifically, the report summarizes progress in five major areas of research. They are: (1) the molten core/concrete interactions study; (2) steam explosion research phenomena; (3) statistical LOCA analysis; (4) UHI model development; (5) two-phase jet loads.

NUREG/CR-1194 PC **A05**/MF **A01**
Michigan Dept. of Public Health, Lansing. Div. of Radiological Health.
Transportation of Radioactive Material in Michigan.
Rept. for 1 Sep 78-31 Aug 79.
Apr 80, 79p
Contract NRC-06-77-051

This report describes a one-year study conducted by the State of Michigan on the transportation of radioactive material into, within, and through the State of Michigan from September 1, 1978 to August 31, 1979. The data collected during the monitoring process are contained in this report. The data relate to personnel radiation exposures, condition of packages, handling practices, and general adherence to regulations governing the safe transport of radioactive materials.

NUREG/CR-1293 PC **A20**/MF **A01**
EG and G Idaho, Inc., Idaho Falls.
Experiment Data Report for Semiscale MOD-3 Small Break Test Series (Tests S-SB-4 and S-SB-4A).
Manuel N. Arevalo, and Kenneth E. Sackett. May 80, 455p EGG-2021
Contract DE-AC07-76IDO1570

Recorded test data are presented for Tests S-SB-4 and S-SB-4A of the Semiscale Mod-3 Small Break Test Series. These are two of several Semiscale tests conducted to investigate the thermal-hydraulic phenomena resulting from a small break loss-of-coolant accident (LOCA) in a pressurized water reactor system and to provide experimental data that can be used to assess the analytical capability of computer codes used in LOCA analysis. The primary objective is to determine the effect of Loss-of-Fluid Test (LOFT) initial conditions and configuration on system behavior during a small break loss-of-coolant experiment. Other objectives are to provide data for comparison with similar tests to be run in the LOFT facility and to investigate scaling effects pertinent to LOFT. This report's purpose is to make the uninterpreted data from Tests S-SB-4 and S-SB-4A available for future data analysis. The data have been analyzed only to the extent necessary to ensure that they are reasonable and consistent.

NUREG/CR-1296 PC **A03**/MF **A01**
Oak Ridge National Lab., TN.
LMFBR Aerosol Release and Transport Program Quarterly Progress Report for July-September 1979,
T. S. Kress. Apr 80, 49p ORNL/NUREG/TM-376
Contract W-7405-eng-26
See also NUREG/CR-1062.

The Aerosol Release and Transport from the Liquid-Metal Fast Breeder Reactor Fuel Program at Oak Ridge National Laboratory is designed to investigate the release, transport, and behavior of radionuclides originating from a hypothetical core-disruptive accident (HCDA) in an LMFBR. The analytical effort is designed to support the experiments and provide an independent assessment of the safety margins that exist for assessment of the radiological consequences of an HCDA. During this reporting period, 13 tests were performed in the FAST facility, including seven tests in the FAST vessel and six tests in the CRI-III vessel, which is part of the FAST facility.

NUREG/CR-1414 PC **A10**/MF **A01**
Rensselaer Polytechnic Inst., Troy, NY. Dept. of Nuclear Engineering.
An Assessment of the Literature Related to LWR Instability Modes.
Topical rept. Sep 78-Jan 80,
R. T. Lahey, Jr., and D. A. Drew. Apr 80, 210p

The purpose of this Topical Report is to present the results of an extensive literature survey on instability modes of relevance to LWR technology. The current understanding of relevant thermal-hydraulic and nuclear-coupled instability modes is summarized and specific recommendations are made for future work.

NUREG-0619 PC **A05**/MF **A01**
Nuclear Regulatory Commission, Washington, DC. Office of Nuclear Reactor Regulation.
BWR Feedwater Nozzle and Control Rod Drive Return Line Nozzle Cracking; Resolution of Generic Technical Activity A-10.
Technical rept.,
R. Snaider. Apr 80, 89p

This report summarizes work performed by the NRC staff in the resolution of Generic Technical Activity A-10, 'BWR Nozzle Cracking'. Generic Technical Activity A-10 is one of the generic technical subjects designated as 'unresolved safety issues' pursuant to Section 210 of the Energy Reorganization Act of 1974. The report describes the technical issues, the technical studies and analyses performed by the General Electric Company and the NRC staff, the staff's technical positions based on these studies, and the staff's plans for continued implementation of its technical positions. It also provides information for further work to resolve the non-destructive examination issue.

ORNL/TM-6892 PC **A04**/MF **A01**
Oak Ridge National Lab., TN.
HTGR Experiment HRB-15B: Particle Loadings and Irradiation in the High Flux Isotope Reactor.
W. E. Thomas, E. L. Long, Jr., J. A. Conlin, and B. P. Johnsen. Dec 79, 73p
Contract W-7405-ENG-26

Candidate high-temperature gas-cooled reactor fissile and fertile particles were irradiated in the High Flux Isotope Reactor removable beryllium reflector facility (RB-5) for eight reactor cycles. The experiment contained 18 different "types" of fissile particles and five different "types" of fertile particles. All uranium was 20% enriched in exp 235 U. The loose particles were loaded into "trays" that resemble flat graphite washers, each having 116 drilled holes in one face. One hundred eighty-four trays were stacked in columns in an alternate fertile particle-fissile particle sequence. The particles were irradiated for 169.4 full power days. The report discusses methods used to specify particle loadings and contains thermal and neutronics results applicable to the irradiation test period. (ERA citation 05:011884)

ORNL/TM-7086 PC **A03**/MF **A01**
Oak Ridge National Lab., TN.
SPQR: A Monte Carlo Reactor Kinetics Code.
S. N. Cramer, and H. L. Dodds. Feb 80, 41p
Contract W-7405-ENG-26

The SPQR Monte Carlo code has been developed to analyze fast reactor core accident problems where conventional methods are considered inadequate. The code is based on the adiabatic approximation of the quasi-static method. This initial version contains no automatic material motion or feedback. An existing Monte Carlo code is used to calculate the shape functions and the integral quantities needed in the kinetics module. Several sample problems have been devised and analyzed. Due to the large statistical uncertainty associated with the calculation of reactivity in accident simulations, the results, especially at later times, differ greatly from deterministic methods. It was also found that in large uncoupled systems, the Monte Carlo method has difficulty in handling asymmetric perturbations. (ERA citation 05:013612)

PAT-APPL-6-039 426 PC **A02**/MF **A01**
Department of Energy, Washington, DC.
Scram Signal Generator.
Patent Application,
E. W. Johanson, and R. Simms. Filed 15 May 79, 14p
Contract W-31-109-ENG-38
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A scram signal generating circuit for nuclear reactor installations monitors a flow signal representing the flow rate of the liquid sodium coolant which is circulated through the reactor, and initiates reactor shutdown for a rapid variation in the flow signal, indicative of fuel motion. The scram signal generating circuit includes a long-term drift compensation circuit which processes the flow signal and generates an output signal representing the flow rate of the coolant. The output signal remains substantially unchanged for small variations in the flow signal, attributable to long term drift in the flow rate, but a rapid change in the flow signal, indicative of a fast flow variation, causes a corresponding change in the output signal. A comparator circuit compares the output signal with a reference signal, representing a given percentage of the steady state flow rate of the coolant, and generates a scram signal to initiate reactor shutdown when the output signal equals the reference signal. (ERA citation 05:018687)

PATENT-4 199 079
Not available NTIS
Department of the Air Force Washington DC
Microsphere Loading Device.
Patent,
Clarence M. Oloff, Willi J. Buehring, and Kevin J. Greenlees. Filed 31 Jul 78, patented 22 Apr 80, 3p AD-D007 158/9, PAT-APPL-929 469
Supersedes PAT-APPL-929 469-78, AD-D005 363.
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

A loading device for transferring radioactive microsphere suspensions from a storage container

to test apparatus having a three way stopcock including three connectors. A 1 ml syringe is connected to one of the stopcock connectors with a 5 ml syringe being connected to a second stopcock connector. A two inch cannula hypodermic needle is connected to the third stopcock connector. The hypodermic needle has airflow passages cut in the connector portion adjacent the needle. (Author)

PB80-168461 MF**$260.00**
Nuclear Regulatory Commission, Washington, DC.
Three Mile Island Number 2, Part 2 Dockets (Post-Accident, July 1, 1979 to October 31, 1979).
1979, 1722 MF sheets
See also PB80-106966. 24X reduction microfiche. Microfiche copy only.

This special package includes Nuclear Regulatory Commission Docket Material for the Three Mile Island No. 2 reactor. These Docket issuances concern the operation of this reactor, after the March 1979 incident, during the period July 1, 1979 to October 31, 1979. The publication, Title List Publicly Available Documents Three Mile Island Unit 2 Docket 50-320 (NUREG 0568, Rev. 1 Supp. 1), will be furnished without charge as part of the order and serves as an index to the second part of this special collection of docket microfiche.

PB80-170434 PC **A04**/MF **A01**
Netherlands Energy Research Foundation ECN, Petten.
Fast Reactor Programme, Fourth Quarter, 1978. Progress Report,
J. C. Plakman. Oct 79, 71p ECN-75

Research on thermochemical stability of URu3 and the preparation of UPd3 is discussed. Preliminary results of creep testing on irradiated heats and welded joints are given. The results of high-cycle fatigue testing reference and irradiated base metal are given. The way in which crack growth and fracture mechanics testing specimens are irradiated is described and the results of a detailed finite element analysis of a central cracked test specimen are discussed. Experiments on gas leakage through concrete/steel interfaces are described. Results of aerosol penetration measurements through artificially made cracks in concrete cylinders are given and a method to determine the dynamic shape factor from the aerosol decay in containments is discussed.

PB80-175755 PC **A05**/MF **A01**
National Academy of Engineering, Washington, DC.
The Outlook for Nuclear Power.
Final rept.,
David L. Bazelon, Harvey Brooks, Earnest F. Gloyna, Wolf Hafele, and Willis M. Hawkins. 1 Nov 79, 81p NAE-AMTS-1979
Presentations at the Technical Session of the Annual Meeting, November 1, 1979, Washington, DC.

This document is a collection of papers by authors from backgrounds in law, the aerospace industry, energy modeling, and engineering, focusing on several aspects of nuclear power. The authors have tried to present a balanced assessment of nuclear power and its role in the nation's energy future. Topics covered are: need for nuclear power worldwide including risks and benefits; technological improvements in the operation, safety, and reliability of nuclear power facilities; comparison to space program experience and commercial aircraft experience; problem of nuclear waste management; and projections of future world energy supply and demand and the role of nuclear power.

PNL-SA-7503 PC **A02**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Initial Stage Restructuring in Sphere-Pac Mixed-Carbide Fuel.
R. J. Guenther, and K. L. Peddicord. 1979, 10p CONF-790306-25
Contract EY-76-C-06-1830
International conference on fast breeder reactor performance, Monterey, CA, USA, 5 Mar 1979.

The analysis of sintering models and mechanisms for mixed-carbide sphere-pac fuel has shown that volume diffusion is the dominant mechanism. The actual diffusion path is not clearly defined but the importance of small pressures in increasing neck growth is apparent. The time dependence of the neck ratios indicates that significant restructuring occurs within 5.6 hours which may be used as a bench mark for the beginning of pore migration. (ERA citation 05:013563)

PNL-SA-7521 PC **A02**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
CORTRAN Code for Temperature Predictions in an LMFBR During a Natural Circulation Transient.
E. U. Khan, and A. Hinds. Jan 79, 6p CONF-790602-92
Contract EY-76-C-06-1830
ANS annual meeting, Atlanta, GA, USA, 3 Jun 1979.

Three transient thermal-hydraulic models, TRAN I, II, III, have been incorporated into the CORTRAN code. The TRAN I, II, III models are similar in as much as they retain the wire-wrap mixing and swirl flow models of the Energy code, i.e., the wire-wrap mixing is modeled by an enhanced eddy diffusivity in the central regions of the bundle and a swirl flow in the region near the duct wall. The fuel rod and duct wall models required to treat the stored heat and thermal inertia effects, are also similar in the three models. Up to 10 radial nodes are allowed in the rods and 6 radial nodes in the duct wall to solve the one-dimensional conduction equation for the rods and duct wall, by finite difference. Temperature-dependent properties are taken into account in calculating rod temperatures. (ERA citation 05:013564)

RD-B-N-4079 PC **A06**/MF **A01**
Central Electricity Generating Board, Berkeley (England). Berkeley Nuclear Labs.
User's Guide to the Reactor Inventory Code RICE.
S. Nair, and M. J. Henning. Jan 78, 117p
U.S. Sales Only.

A complete description is given of the input data requirements for the reactor inventory code RICE. Facilities for modifying temporarily the library and input data are described. Three sample cases are also included, both input and output, to facilitate programme testing. The three cases correspond to the three fundamentally different ways of running the programme, namely, to calculate actinide inventories only, to calculate fission product inventories only, or to calculate composite actinide-fission product inventories. RICE is written in Fortran IV (level H) and is compiled under release 20.6, OPT = 2 on the IBM 370/165 computer. (Atomindex citation 09:419308)

RD-B-N-4289 PC **A06**/MF **A01**
Central Electricity Generating Board, Berkeley (England). Berkeley Nuclear Labs.
Comparison of the Fault Study Codes KINAGRAX and DAGGER.
A. R. R. Telford, and P. Pearson. May 78, 120p
U.S. Sales Only.

At the request of the Safety Technology Group, GDCD, a comparison of the CEGB fault study code, KINAGRAX, with that of the NPC, DAGGER, has been carried out covering all the more important fault conditions. There are many differences in the model representation of the two codes but wherever possible these have been eliminated or reduced by adjustment of the data used. The faults covered were: single and all circulator failures, hot and cold reactivity faults, depressurisation and top dome failure. The faults studied have, in most cases, been represented in a simplified form since exact representation of a particular fault has not been the aim of the study and simplification has eased the comparison exercise. The agreement between the two codes is good, with peak can temperatures differing by less than 5 exp 0 C for all faults except the top dome failure in which discrepancies of about 10 exp 0 C were observed. It is concluded that the basic computational techniques for the two codes give essentially consistent results for all the more important AGR faults. This lends confidence to the results obtained using either code in isolation. (Atomindex citation 09:418113)

RI-37 PC **A02**/MF **A01**
Radievyi Inst., Leningrad (USSR).
Methods for Determination of Certain Radioactive Isotopes During Exploitation of WWER-440 Reactor of the Kola Nuclear Power Plant. 2. Induced Radioactivity.
A. V. Stepanov, P. G. Krutikov, and T. P. Makarova. 1976, 13p
In Russian.
U.S. Sales Only.

This booklet is the second part of a publication series on the assessment technique for the radioactive isotopes produced in operating WWER-440 (VVEhR-44O) reactors. The determination procedures are described for some radioactive isotopes used for estimation of corrosion damage of the reactor. The methods for determination of radioactive isotopes of sodium, potassium and tritium produced by reactor coolant macroimpurities activation are given. The technique has been prepared and proved in the course of co-operation of the V.G. Khlopin Radium Institute and the Kola Nuclear Power Plant. (Atomindex citation 09:400792)

RISO-M-1996 PC **A03**/MF **A01**
Risoe National Lab., Roskilde (Denmark).
Department of Reactor Technology Annual Progress Report 1 January–31 December 1977.
Apr 78, 49p
U.S. Sales Only.

The work of the Department of Reactor Technology within the following fields is described: reactor engineering, reactor operation, structural reliability, system reliability, reactor physics, fuel management, reactor accident analysis for LOCA and ECC, containment analysis, experimental heat transfer, reactor core dynamics and power plant simulators, experimental activation measurements and neutron radiography at the DR 1 reactor, underground storage of gas, solar heating and underground heat storage, wind power. (Atomindex citation 09:412285)

RISO-M-2122 PC **A03**/MF **A01**
Risoe National Lab., Roskilde (Denmark).
AFG-MONSU. A Program for Calculating Axial Heterogeneities in Cylindrical Pin Cells.
H. Neltrup, and P. Kirkegaard. Aug 78, 33p
U.S. Sales Only.

The AGF-MONSU program complex is designed to calculate the flux in cylindrical fuel pin cells into which heterogeneities are introduced in a regular array. The theory - integral transport theory combined with Monte Carlo by help of a superposition principle - is described in some detail. Detailed derivation of the superposition principle as well as the formulas used in the DIT (Discrete Integral Transport) method is given in the appendices along with a description of the input structure of the AFG-MONSU program complex. (Atomindex citation 09:418489)

RISO-M-2132 PC **A03**/MF **A01**
Risoe National Lab., Roskilde (Denmark).
Nuclear Power Reactor Technology. Work, Experience and Services Offerede by Risoe National Laboratory.
Sep 78, 29p
U.S. Sales Only.

Risoe National Laboratory was established more than twenty years ago with research and development of nuclear reactor technology as its main objective. The Laboratory has by now accumulated many years of experience in a number of areas vital to nuclear reactor technology. The work and experience of, and services offered by the Laboratory within the following fields are described: Health physics site supervision; Treatment of low and medium level radioactive waste; Core performance evaluation; Transient analysis; Accident analysis; Fuel management; Fuel element design, fabrication and performance evaluation; Non-destructive testing of nuclear fuel; Theoretical and experimental structural analysis; Reliability analysis; Site evaluation. (Atomindex citation 09:419364)

RISO-M-2138 PC **A05**/MF **A01**
Risoe National Lab., Roskilde (Denmark).
CORECOOL, Model Description of the Programme.
J. G. M. Andersen, and H. Abel-Larsen. Nov 78, 93p

U.S. Sales Only.

CORECOOL, Convection and Radiation Emergency Cooling, is a model for the two-phase flow and heat transfer in a fuel element during the core heat-up phase following a loss of coolant accident. The model for the two-phase flow is based on a solution of the conservation equations with a separate description of the two phases and thermodynamic non-equilibrium. The flow-regimes considered are drop flow and film flow. The heat transfer consists of convection, sputtering and radiation heat transfer. The documentation of CORECOOL consists of four parts: I) model description, II) programme description (COMMERCIAL), III) users guide (COMMERCIAL) IV) verification (COMMERCIAL). CORECOOL is a joint project between Risoe National Laboratory Denmark and General Electric Company, San Jose, USA. (Atomindex citation 10:441309)

RISO-M-2152 PC **A02**/MF **A01**
Risoe National Lab., Roskilde (Denmark).
Details of Design, Irradiation and Fission Gas Release for the Danish UO sub 2 -Zr Irradiation Test 022.
C. Bagger, H. Carlsen, and P. Knudsen. Dec 78, 14p
U.S. Sales Only.

Test 022 comprised three UO sub 2 -Zr test fuel pins which were irradiated in the DR 3 reactor at Risoe at 7.2 MPa (70 ato) system pressure. A burnup of approximately 3530 GJ/kg U (36,000 MWD/te UO sub 2) was accumulated at heat loads in the range 35 to 53 kW/m (350 to 530 W/cm) (test avg. values). Fission gas analysis for two of the pins showed that the releases were 48 and 36%. The experimental data are presented in sufficient detail for use in the validation of fuel performance codes. (Atomindex citation 10:441738)

RISO-M-2170 PC **A02**/MF **A01**
Risoe National Lab., Roskilde (Denmark).
Comparison of Image Quality of Nuclear Fuel Neutron Radiographs Taken on Silver Halide and Nitrocellulose Film.
J. C. Domanus. Apr 79, 6p CONF-791101-1
World conference on nondestructive testing, Melbourne, Australia, 18 Nov 1979.
U.S. Sales Only.

For the assessment of image quality of nuclear fuel by neutron radiographs the ASTM method seems inadequate; therefore another method was tested, used previously for the assessment of the accuracy of dimension measurements. Silver halide and nitrocellulose films were used in the comparison. (Atomindex citation 10:463557)

RISO-M-2171 PC **A02**/MF **A01**
Risoe National Lab., Roskilde (Denmark).
First Attempt to Classify Defects Revealed by Neutron Radiography in Nuclear Fuel for Light Water Reactors.
J. C. Domanus. Apr 79, 7p CONF-791101-2
World conference on nondestructive testing, Melbourne, Australia, 18 Nov 1979.

From about 2000 neutron radiographs taken routinely mainly during post irradiation examination of reactor fuel, typical defects were chosen to establish a classification of defects. They are also classified according to their intensity. The classification is illustrated with characteristic defects for each location where they may accur. (Atomindex citation 10:463616)

SAND-78-0689 PC **A04**/MF **A01**
Sandia Labs., Albuquerque, NM.
Wiring for the Secure Storage Module for the Plutonium Protection System.
H. D. Arlowe. Dec 79, 52p
Contract EY-76-C-04-0789

The wiring for the SSM is divided into two major subsystems: the logic subsystem and the power subsystem. The logic subsystem uses flat ribbon cables and printed wiring cards for low-level signal distribution. Its primary purpose is to provide communications from the Container Modules (CMs) directly to the microcomputer in the SSM Controller. The power subsystem uses conventional cables and does not generally handle signals of less than 30 volts. The 110V ac power is routed to all equipment in the Electronic Enclosure and to cubicle cooling fans. Wiring for drive power and monitor signals for the carrousel stepper motors, deadbolts, and CM-locking solenoids are provided, as well as for the annuciator status lights and tamper switches. (ERA citation 05:011388)

SAND-79-1046C PC **A02**/MF **A01**
Sandia Labs., Albuquerque, NM.
Active Neutron Technique for Detecting Attempted Special Nuclear Material Diversion.
G. W. Smith, and L. G. Rice, III. 1979, 18p
CONF-791117-19
Contract EY-76-C-04-0789
ANS topical conference, Kiawah Island, SC, USA, 26 Nov 1979.

The identification of special nuclear material (SNM) diversion is necessary if SNM inventory control is to be maintained at nuclear facilities. (Special nuclear materials are defined for this purpose as either exp 235 U of exp 239 Pu.) Direct SNM identification by the detection of natural decay or fission radiation is inadequate if the SNM is concealed by appropriate shielding. The active neutron interrogation technique described combines direct SNM identification by delayed fission neutron (DFN) detection with implied SNM detection by the identification of materials capable of shielding SNM from direct detection. This technique is being developed for application in an unattended material/equipment portal through which items such as electronic instruments, packages, tool boxes, etc., will pass. The volume of this portal will be 41-cm wide, 53-cm high and 76-cm deep. The objective of this technique is to identify an attempted diversion of at least 20 grams of SNM with a measurement time of 30 seconds. (ERA citation 05:009738)

SAND-79-7037 PC **A03**/MF **A01**
Lovelace Center for the Health Sciences, Albuquerque, NM. Clinical Research Div.
Development of an Automated Stress/Duress Detection System. Phase II: Field Studies, Albuquerque Police Department.
W. C. Tuttle, and J. G. Davis. Dec 79, 27p
Contract EY-76-C-04-0789

This study has shown that remote analysis of heart rate has potential as an effective means for automatic detection of stress in guards. The analysis of the data suggests that a heart rate greater than either CHR + 20% (as established in the exercise test) or 150 bpm is the best criterion for initial establishment of alarm criteria. This algorithm may be refined greatly through application of more extensive computer analysis. (ERA citation 05:013189)

UCID-18141 PC **A02**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Technical Evaluation of the Proposed Deletion of a Reactor Trip on a Turbine Trip Below 50-Percent Power for the Joseph M. Farley Nuclear Power Plant.
W. E. Reeves. Dec 79, 10p
Contract W-7405-ENG-48

The Alabama Power Company's proposed license amendment for the deletion of a reactor trip on a turbine trip below 50% power for the Joseph M. Farley nuclear power plant is presented. This report is supplied as part of the Selected Electrical, Instrumentation, and Control Systems Issues Program being conducted for the US Nuclear Regulatory Commission by Lawrence Livermore Laboratory. (ERA citation 05:011908)

UCRL-15144 PC **A05**/MF **A01**
Heineke (J.M.) and Associates, Livermore, CA.
Insider Threat to Secure Facilities: Data Analysis.
7 Dec 79, 86p
Contract W-7405-ENG-48

This report is the culmination of a project in which data from several industries confronting internal security threats were collected and analyzed. The industries and threats involved are deemed to be analogous in one or more respects to potential threats confronting decision makers in the nuclear industry. The analog internal threats consist of bank frauds and embezzlements over $10,000, computer crimes of various types and insider drug thefts from drug manufactures and distributors. These data have been subjected to careful analysis utilizing both descriptive and formal statistical techniques. A number of findings are quite suggestive as to the general nature of the internal threat and are discussed and interpreted in terms of thenuclear industry analogy. (ERA citation 05:013190)

UNI-1318 PC **A03**/MF **A01**
UNC Nuclear Industries, Inc., Richland, WA.
Ultrasonic Flowmeters. Interim Progress Report.
W. D. Wittekind, and H. Toffer. 31 Jan 79, 28p
Contract EY-76-C-06-1857

Ultrasonic flow measuring and flow characterization methods were studied for use in flows of primary coolant, secondary water and auxiliary water systems because this method does not require penetration or alteration of the fluid containment structure. An evaluation of commercially available equipment is given and testing of the equipment is described. (ERA citation 05:014133)

UTNL-D-0013 PC **A02**/MF **A01**
Tokyo Univ. (Japan). Nuclear Engineering Research Lab.
Stress Measurement for and Thermal Characteristics of Fuel Claddings in Unsteady and Pulsed Reactivity Operations.
T. Sukegawa, K. Miya, H. Wakabayashi, and T. Tamura. Jul 77, 25p
In Japanese.
U.S. Sales Only.

When the unsteady operation or pulsed reactivity operation of the reactor Yayoi of the University of Tokyo is carried out, stress arises in the fuel claddings of SS 304 due to the temperature rise of fuel. Especially in the pulsed reactivity operation, relatively rapid temperature rise is experienced. Accordingly, the fracture safety of the fuel cladding was investigated. The unsteady operation of the reactor Yayoi is carried out within the range of 200 KW peak output, 600 KW.sec/cycle maximum integrating output and 400 deg C highest fuel temperature. A foil type thermocouple and strain gauges were attached on the surface of each cladding. In the pulsed reactivity operation, the response of strain gauges and the measuring system was examined first, and was confirmed to be sufficient. Then the measurement was carried out. (Atomindex citation 09:411977)

UTNL-D-0016 PC **A05**/MF **A01**
Tokyo Univ. (Japan). Nuclear Engineering Research Lab.
Investigations on the Pulse Operation of YAYOI. Pulse Operation with Linac Pulse.
Apr 77, 85p
In Japanese.
U.S. Sales Only.

Ten independent documents are presented concerning the pulse operation of YAYOI, which were prepared in the period between July, 1976, and March, 1977. The titles of the documents are: (1) the operational sequence of the linac neutron generating facility, (2) safety systems of linac pulse operation and the treatment and preservation of neutron generating targets, (3) nuclear calculation concerning linac pulse operation, (4) simulated natural uranium core, (5) linac neutron target system, (6) computer processing accompanying linac pulse operation, (7) fundamental concept of electron beam generation within the reactor room, (8) reactor room shielding requirements for the linac neutron source, (9) TOF measuring room, and (10) utilization of low energy neutrons from P-YAYOI operation. (Atomindex citation 09:411979)

UTNL-D-0017 PC **A06**/MF **A01**
Tokyo Univ. (Japan). Nuclear Engineering Research Lab.
Reference Material Concerning Reactivity Pulse Operation Mode POS-1 X 4, 4S of 'Yayoi'.
Aug 77, 115p
In Japanese.
U.S. Sales Only.

A summary is presented of the results of the project for changing Yayoi to pulse operation carried

out from July, 1976 to March, 1977. This report was drawn up as the reference material for the application for approval of reactor installation change concerning the reactivity pulse operation mode POS-1 x 4, 4S in particular. (Atomindex citation 09:411980)

ZfK-354 PC **A02**/MF **A01**
Zentralinstitut fuer Kernforschung, Rossendorf bei Dresden (German D.R.).
Experimental Investigation of Flow-Induced Control Element Movements by Means of Noise Analysis Technique.
G. Grunwald, P. Liewers, P. Schumann, and F. P. Weiss. Mar 78, 9p
U.S. Sales Only.

Experiments at an air flow model of the control element channel which have clarified the reasons for these amplitude discrepancies for the most part are described. (Atomindex citation 09:418477)

ZJE-224 PC **A03**/MF **A01**
Skoda, Plzen (Czechoslovakia). Zavod Vystavba Jadernych Elektraren.
Tesla RPP 16 Computer Special Hardware and Utility Software for Experimental Process Control of the A1 Power Plant Reactor.
V. Grof. 1978, 30p
U.S. Sales Only.

The TESLA RPP 16 computer is used for A-1 reactor experimental control. Special hardware and application software are being developed for this purpose. The interface for digital measurement of the positions of the scram, control and compensating rods consists of a system of signal measurement and transfer from the selsyn transmitter via special cables over a distance of 150 m to the power plant control room. The neutron power measurement system consists of a digital section connected to the RPP 16 computer and of an analog section used for testing the digital section function or for independent neutron power measurement. For process control of the reactor by the RPP 16 computer, application software was developed allowing to indirectly measure A-1 reactor parameters, such as reactivity, period, coolant flow, and thermal output. (Atomindex citation 10:463607)

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AED-Conf-77-617-001 PC **A02**/MF **A01**
Zentralstelle fuer Atomkernenergie-Dokumentation (ZAED), Eggenstein-Leopoldshafen (Germany, F.R.).
Effects of the Requirements and Material Properties on the Welding Technique in the Building of Reactor Containments.
W. Eicke. 1977, 11p CONF-771265-11
In German.Welding fabrication methods, Aachen, F.R. Germany, 1 Dec 1977.
U.S. Sales Only.

The reactor containment has an essential protective function as part of the safety inclusion in nuclear power plants. Just like the reactor pressure vessel, this full-pressure steel container is subject to a fast transformation and development process, particularly due to the requierements of the material as a result of ever-growing safety requirements. The present work deals with the specification and regulations and the materials problem regarding welding techniques which have recently been considerably influenced by the new guidelines of the reactor safety commission. (Atomindex citation 09:395699)

AED-Conf-78-031-001 PC **A02**/MF **A01**
Zentralstelle fuer Atomkernenergie-Dokumentation (ZAED), Eggenstein-Leopoldshafen (Germany, F.R.).
Welding of Thick-Walled Containers - Selected Exampies.
H. Cerjak, and J. Schmidt. 1978, 13p CONF-780156-1
In German.Meeting on the welding of containers and pipes, Muenchen, F.R. Germany, 30 Jan 1978.
U.S. Sales Only.

The welding of thick-walled containers is discussed under the aspects of construction and design, materials selection, choice and qualification of the method of production, the production process and testing, using the example of reactor components. It is shown how the welding construction can be optimized by using selected materials in connection with optimum, continuously controlled production and processing methods. (Atomindex citation 09:395696)

AGNS-35900-1.2-28 PC **A03**/MF **A01**
Allied-General Nuclear Services, Barnwell, SC.
Studies and Research Concerning BNFP: Shearing Tests Conducted at Allied-General Nuclear Services for the Consolidated Fuel Reprocessing Program.
B. Weil, and G. Townes. Sep 79, 42p ORNL/TM-7046
Contract ET-78-C-09-1040

An experiment conducted to shear two dummy PWR subassemblies is described. Results pertain to the removal of end hardware by shearing, spacer grid fragmentation, the character of sheared product, product leachability, shearing force requirements, and the effects of compaction. (ERA citation 05:002578)

BMFT-FB-K-78-03 PC **A05**/MF **A01**
Bundesministerium fuer Forschung und Technologie, Bonn-Bad Godesberg (Germany, F.R.).
Investigation of the Fuel Burn-Up with Non-Destructive Methods.
S. Hiller. Oct 78, 94p
In German.
U.S. Sales Only.

The possibilities of non-destructive burn-up determination were investigated with the aid of gamma spectrometry and using a fuel rod which had previously been irradiated for 164 days and had been decaying for 570 days. Thereby, not only a high resolution Ge(Li)-spectrometer system but also an NaI(Tl)-scintillation detector came into use. By means of the Ge(Li)-detector system, it is possible, after the respective calibration, to determine the absolute burn-up at distinct points on the fuel rod via the intensity of selected lines of the gamma spectrum. By means of integral measurement of the gamma radiation at an energy threshold of 0.3 Mev and using a scintillation counter, burn-up profiles were produced which supply, in addition, information concerning the length and position of the individual fuel pellets and also concerning density variations of individual pellets. (Atomindex citation 10:421414)

CEA-CONF-3929 PC **A02**/MF **A01**
CEA Centre d'Etudes Nucleaires de Saclay, Gif-sur-Yvette (France). Dept. de Surete Nucleaire.
Effective Ultrasonic Beam. Characteristics as the Basis for Objective NDT Specifications.
R. Saglio, and A. C. Prot. 1976, 17p CONF-7609101-2
Specialist meeting on ultrasonic inspection of reactor components, Risley, UK, 27 Sep 1976.
U.S. Sales Only.

Present methods of ultrasonic nondestructive testing are not convenient for nuclear safety purposes: in-service inspection, for instance, requires the use of valuable information, that is, having sufficient ability to describe the actual state of the structure under test. Present specifications are partly, if not entirely, arbitrary. For instance, the evaluation of the defect size is made from standard flaw considerations, which are far from being entirely objective, even when using sophisticated automatic scanning systems. New draft specifications will have to be written, making use of a new concept; the 'effective ultrasonic beam', related to that part of the beam which may be considered as cylindrical, and in which the sensitivity may be considered as constant within given and known margins. This concept is particularly useful when applied to 'shaped beams' like focussed beams (the focussing effect may be obtained by means of lenses, mirrors, etc..., or by electronic means: phased array of transducers for instance). (Atomindex citation 10:423747)

CEA-CONF-4193 PC **A02**/MF **A01**
CEA Centre d'Etudes Nucleaires de Saclay, Gif-sur-Yvette (France). Services des Piles.
Studies on High Temperature Reactors at Osiris Experimental Reactor.
H. Loriers, A. Ballagny, J. P. Genthon, and G. Micaud. 1977, 21p CONF-771189-3
In French.Symposium on the future of research reactors, Grenoble, France, Nov 1977.
U.S. Sales Only.

For the study of the HTGR core materials it is necessary to have irradiation facilities with temperatures between 300 and 1400 exp 0 C and graphite fluence damage reaching 12 10 exp 21 n.cm exp -2 . Neutron fluxes in experimental locations of the Osiris reactor are 6.3 10 exp 14 n.cm exp -2 .s exp -1 max in the same damage unit and it is possible to obtain these doses in a reasonable length of time. The gamma fluxes in these places allow the construction of devices without added electric heating and so there are more reliable in time. (Atomindex citation 10:433741)

DOE/NE-0003/7 PC **A10**/MF **A01**
Department of Energy, Washington, DC.
Fuel-Cycle Facilities: Preliminary Safety and Environmental Information Document. Volume VII.
Jan 80, 223p

Information is presented concerning the mining and milling of uranium and thorium; uranium hexafluoride conversion; enrichment; fuel fabrication; reprocessing; storage options; waste disposal options; transportation; heavy-water-production facilities; and international fuel service centers. (ERA citation 05:013580)

DOE/TIC-11042 PC **A02**/MF **A01**
Hanford Engineering Development Lab., Richland, WA.
Computerized Fuel Measurement from X-Ray Radiography.
D. R. Green, R. A. Karnesky, and C. Bromley.
Nov 79, 11p
Contract EY-76-C-14-2170

Techniques have recently been developed which allow nondestructive dimensional characterization of fuel pellets within fuel pins. Fuel pellet diameters can be measured with an accuracy of +- 0.0005 inch (0.0012 cm) using standard vendor-supplied radiography, or with an accuracy of +- 0.0002 inch (0.0005 cm) using x-ray radiography produced by a special HEDL developed technique. These data are needed for the detailed evaluation of the effects of irradiation on fuel behavior. The radiographs to be analyzed are transformed into a digital form using a computer controlled x-y scanning microdensitometer. The digital image is then recorded on a magnetic tape which is then sent to the central computer (CDC 6600) for analysis with FORTRAN IV software. Pellet diameters are determined, statistically analyzed, and the results are tabulated with a high speed line printer. These reports are also placed on magnetic tape storage for future computerized comparison and evaluation. (ERA citation 05:012381)

DPST-79-128-1/2 PC **A03**/MF **A01**
Du Pont de Nemours (E.I.) and Co., Aiken, SC. Savannah River Lab.
Exp 238 Pu Fuel Form Processes. Bimonthly Report, January-February 1979.
10 Dec 79, 44p
Contract EY-76-C-09-0001

Microstructural studies of small-scale GPHS fuel pellets indicate that a reduction in the sintering temperature of the high-fired shards from 1600 exp 0 C to 1400 exp 0 C had (1) only small effects on microstructure and (2) apparently no effect on dimensional stability or fracture resistance of the pellets. Small exp 238 PuO sub 2 pellets hot pressed to different densities cracked during reoxidation in air at both low and high temperatures when microstructural densities exceeded 84 to 85% theoretical density. A new furnace rack-tray assembly made of ZGS Pt-10% Rh was designed for the plutonium fuel fabrication sintering furnace to provide capability for sintering high-fired (1600 exp 0 C) shards for the production of General-Purpose Heat Source fuel pellets. The first unreduced hot-pressed pellets of PuO sub 2 have been fabricated by using an alumina die liner in a graphite die-susceptor. The pellets were integral and uncracked after heat treatment in oxygen. (ERA citation 05:013195)

DPST-79-128-3/4 PC **A03**/MF **A01**
Du Pont de Nemours (E.I.) and Co., Aiken, SC. Savannah River Lab.

Exp 238 Pu Fuel Form Processes Bimonthly Report, March-April, 1979.
Mar 79, 47p
Contract EY-76-C-09-0001

Progress in the Savannah River Laboratory exp 238 Pu Fuel Form Program is reported. Goals of the Savannah River Laboratory (SRL) program are to provide technical support for the transfer of DANSP exp 238 Pu fuel form fabrication operations from Mound Laboratory to new facilities at the Savannah River Plant (SRP), to provide the technical basis for exp 238 Pu scrap recovery at SRP, and to assist in sustaining plant operations. The program includes: demonstration and adaptation of processes and techniques, developed by the Los Alamos Scientific Laboratory (LASL) and Monsanto Research Corporation (MRC), for production at SRP. (Information from the demonstration will provide the technical data for technical standards and operating procedures.); technical support to assist plant startup of new processes and to ensure continuation of safe and efficient production of high-quality heat-source fuel; and technical assistance after startup to accomodate changes in product and product specifications, to assist user agencies in improving product performance, to assist SRP in making process improvements that increase process efficiency and safety and product reliability, and to adapt plant facilities for new products. (ERA citation 05:013196)

GA-A-15565 PC **A04**/MF **A01**
General Atomic Co., San Diego, CA.
Effects of Methane Concentration on the Controlled-Impurity Helium Corrosion Behavior of Selected HTGR Structural Materials.
W. R. Johnson, and L. D. Thompson. Dec 79, 64p
Contract AT03-76ET35300

The corrosion behavior of candidate structural alloys in a series of three simulated advanced gas-cooled reactor environments at 900 exp 0 C (1652 exp 0 F), with methane concentration varied, is discussed. The alloys investigated include three wrought alloys, Hastelloy X, Inconel 617, and Incoloy 800H; two cast superalloys, Rene 100 and IN 713; one centrifugally cast alloy, HK 40; and an oxide-dispersion-strengthened alloy, MA 754. Corrosion behavior was found to be strongly dependent upon both the alloy chemistry and the environment. Oxidation, carburization, and/or mixed behavior was observed depending upon the specific conditions. An equilibrium thermodynamics approach has been used to predict alloy behavior and explain observations relevant to the understanding of gas/metal interactions in reactor helium, which inherently contains small amounts of reactive impurity species. Carburization was identified as the primary corrosion phenomenon of concern, and detailed analyses were performed to determine the susceptibility and control of carburization reactions. The presence of alumina scales, containing small amounts of titanium, was found to be particularly effective in inhibiting carburization. Small variations in methane concentration have been shown to have a dramatic effect upon the oxidation potential and subsequent corrosion behavior of the alloy systems. (ERA citation 05:013553)

GA-A-15595 PC **A02**/MF **A01**
General Atomic Co., San Diego, CA.
Availability Calculations for Nuclear Material Processing Facilities.
N. D. Holder. Oct 79, 15p CONF-791103-57
Contract AT03-76SF71053
American Nuclear Society meeting, San Francisco, CA, USA, 12 Nov 1979.

Methods for developing reliability and maintainability information and integrating it into availability calculations useful in the design and development of nuclear fuel processing facilities are being investigated. Effective availability (actual productive time) is of greater interest than the more traditional operating availability. Actual productive time calculations allow more precise estimates of redundant equipment and surge storage needs. Judgmental estimates of relability and maintainability from personnel involved in equipment design can be used as interim data to guide developmental efforts. These data can be used in computer modeling of integrated process operations. Simulated process operations can be used to study the effects of various redundant equipment and surge storage configurations on plant effective availability. (ERA citation 05:008138)

GEFR-SP-191 PC **A02**/MF **A01**
General Electric Co., Sunnyvale, CA. Advanced Reactor Systems Dept.
Corrosion Issues in Steam Generators of the Fast Breeder Reactor Systems.
C. N. Spalaris. Dec 79, 16p CONF-800204-5
Contract AT03-76SF70030
Energy-sources technology conference, New Orleans, LA, USA, 3 Feb 1980.

Reliability of sodium-heated steam generators is the key element to successful demonstration of Liquid Metal Fast Breeder Reactor. Corrosion resistance of the alloy selected for constructing the steam generators is paramount to high component reliability. A program was undertaken in th US to study the corrosion resistance of 2 1/4Cr-1Mo alloy, the reference construction material for the sodium heated steam generators. Test conditions selected for the experiments represent a wide spectrum of normal and faulted chemistry environments. The results obtained were used to establish (a) the basis for corrosion allowance in design, and (b) an understanding of temperature regimes, metallurgical condition and concentration of impurities that must be avoided in order to achieve high reliability of components. Experimental details, major findings, and significance of these to component reliability are reviewed in this paper. (ERA citation 05:011889)

HEDL-SA-1723-FP PC **A02**/MF **A01**
Hanford Engineering Development Lab., Richland, WA.
Automated in-Line Measurement of Nuclear Fuel Pellets.
D. R. McLemore, and D. H. Nyman. 1979, 23p
CONF-790602-91
Contract EY-76-C-14-2170
ANS annual meeting, Atlanta, GA, USA, 3 Jun 1979.

HEDL is currently developing, fabricating, and evaluating automated fuel fabrication equipment with the goals of reduced personnel exposure, improved safeguards/accountability and improved fuel performance. One of the automated equipment items which has been fabricated is a fuel pellet inspection system. This system inspects fuel pellets for surface flaws and measures pellets for length, diameter, and weight at a rate of one pellet per second. The inspected pellets are sorted automatically and the results of the inspection are transmitted to a central computer for trend analysis and verification of accountability data. 11 figures. (ERA citation 05:008134)

HEDL-TME-79-13 PC **A05**/MF **A01**
Hanford Engineering Development Lab., Richland, WA.
FUELOG: A System Dynamics Model of the Nuclear Fuel Cycle.
S. R. Fields. Jan 80, 95p
Contract EY-76-C-14-2170

FUELOG, a system dynamics model of the nuclear fuel cycle, has been developed to a preliminary phase. FUELOG, a hierarchically structured model programmed in the Advanced Continuous Simulation Language (ACSL), is designed to facilitate comprehensive evaluations of the nuclear fuel cycle or of sselected facets of the cycle. (ERA citation 05:013581)

IBK-1427 PC **A04**/MF **A01**
Institut za Nuklearne Nauke Boris Kidric, Belgrade (Yugoslavia).
Certification of Fuel Cladding and Grids Materials in out of Pile Conditions.
V. M. Stefanovic, J. V. Jovasevic, V. D. Jovasevic, and Z. L. Spasic. 1977, 51p
In Serbian.
U.S. Sales Only.

The basic standard specifications for fuel rod cladding and bundle materials, are selected. In this paper the standard specifications of material for Zircaloy and plugs and stainless steel springs of fuel rod cladding are presented. The material specification for a Zircaloy fuel bundle assembly Cgrids) is also given. (Atomindex citation 09:418591)

INIS-mf-4310 PC **A06**/MF **A01**
Instituto de Pesquisas Radioativas, Belo Horizonte (Brazil).
Contribution in Reprocessing Studies. Radiolysis Influence in Ruthenium's Extraction.
P. G. V. de Almeida. 1973, 121p
In Portuguese.Thesis.
U.S. Sales Only.

Gamma radiation effect on extraction coefficient of ruthenium by pure TBP is studied. Samples of ruthenium in different concentrations of HNO sub 3 were irradiated. Extraction coefficient is found by measuring gamma activity of 498 keV of exp 103 Ru from organic and aqueous phases. Extraction coefficient in such conditions depends on the radiation doses. There is an increase in the coefficient of the acid. However the saturation velocity is proportional to HNO sub 3 concentration. The variations of the extraction coefficient due to HNO sub 3 radiolysis which gives HNO sub 2 as a result is presented. (Atomindex citation 09:388517)

INIS-mf-5100 PC **A02**/MF **A01**
Vyskumny Ustav Jadrovych Elektrarni, Jaslovske Bohunice (Czechoslovakia).
Corrosion Processes in Nuclear Power Plant Primary Circuits.
V. Rypar. 2p CONF-7804146-5(Sum.)
In Czech.Corrosion problems on nuclear reactor components, Piestany, Czechoslovakia, 12 Apr 1978.
U.S. Sales Only.

No abstract available.

Juel-1494 PC **A05**/MF **A01**
Kernforschungsanlage Juelich G.m.b.H. (Germany, F.R.). Inst. fuer Chemische Technologie.
Method for the Preparation of Uranium Fuel Particles by Loading Ion Exchange Resin.
N. Abd El Monem. Mar 78, 93p
In German.Thesis.
U.S. Sales Only.

The complete loading of weakly acid resin particles could be attained by multi-stage exchange with uranyl nitrate solutions of growing concentration. The setting of pH-values for the individual stages was achieved by the addition of ammonia. For the technical implementation, a loading cascade was constructed, consisting of 4 stages and working according to the counter-current principle. The loaded resin particles obtained by this method can be further processed into fuel particles by subsequent heat treatment. (Atomindex citation 10:421389)

Juel-1501 PC **A06**/MF **A01**
Kernforschungsanlage Juelich G.m.b.H. (Germany, F.R.). Inst. fuer Reaktorwerkstoffe und Heisse Zellen.
Stereometric Analysis of Grafitic Reactor Materials.
H. Uhlenbruck, K. Koizlik, W. Delle, and H. Nickel. Apr 78, 122p
In German.Thesis.
U.S. Sales Only.

Irrespective of the special type of fuel elements and apart from the heavy metal inventary, the core of a gas-cooled high temperature reactor consists only of different sorts of nuclear carbons. On the way of reaching a high standard of safety and economy, their characterization and quality control has become an indispensable necessity an important material parameter for these procedures in the porosity of graphitic reactor materials. This report gives an introduction to fundamentals and technique of a new method of determination of the macro- and mesoporosity, namely the stereometric analysis. Here the measuring procedure is based on the automatic electronic image analysis, and the mathematical calculations are characterized by the term stereometry. (Atomindex citation 10:420702)

JAERI-M-7647 PC **A02**/MF **A01**
Japan Atomic Energy Research Inst., Tokyo.
High-Temperature Irradiation Effects on Mechnical Properties of HTGR Graphites.
T. Oku, M. Eto, and K. Fujisaki. Apr 78, 20p

In Japanese.
U.S. Sales Only.

The irradiation effects on stress-strain relation, Young's modulus, tensile strength, bending strength and compressive strength of HTGR graphites were studied in irradiation temperature ranges of 200 - 300 exp 0 C and 800 - 1400 exp 0 C and in neutron fluences up to 7.4 x 10 exp 20 n/cm exp 2 and 3 x 10 exp 21 n/cm exp 2 (> 0.18 MeV). Fracture criteria and strain energy to fracture of the unirradiated and the irradiated graphites were also examined. (1) Neutron fluence dependences are similar in Young's modulus, tensile strength and bending strength. (2) The change of compressive strength and of tensile and bending strengths with neutron fluence differ; the former varies with graphite kind. (3) At lower irradiation temperatures the bending fracture strain energy decreases with increasing neutron fluence and at higher irradiation temperatures it increases. (4) The fracture criteria of graphites deviates from the constant strain energy theory (alpha = 0.5) and the constant strain theory (alpha = 1), shifting from alpha asymptotically equals 0.5 to alpha asymptotically equals 1 with increasing irradiation temperature. (Atomindex citation 10:425999)

K/OA-4420(Rev.2) PC **A04**/MF **A01**
Union Carbide Corp., Oak Ridge, TN. Nuclear Div.
Onsager's Pancake Approximation for the Fluid Dynamics of a Gas Centrifuge.
H. G. Wood, III, and J. B. Morton. Jan 80, 60p
Contract W-7405-ENG-26

A previously unpublished theory for describing the internal flow in a gas centrifuge is presented. The theory is based on boundary layer type arguments on the side walls of the centrifuge with the additional approximation of neglecting radial diffusion of radial momentum. The effects of the top and bottom end caps are incorporated through Ekman layer solutions. The results are presented in a form amenable to numerical calculations. Some sample calculations are presented for the special case of a centrifuge with a linear temperature profile on the wall and the top and bottom of the centrifuge at the same temperature as the corresponding end of the side wall. (ERA citation 05:013127)

MLM-2683 PC **A02**/MF **A01**
Mound Facility, Miamisburg, OH.
Moisture Content of PuO sub 2 Fuel Used for the Milliwatt Generator Heat Source.
W. A. Zanotelli. 31 Jan 80, 12p
Contract EY-76-C-04-0053

The determination of the moisture content of exp 238 Pu dioxide fuel for use in Milliwatt Generator heat sources was studied in an attempt to more clearly define the production fuel preloading procedures. The study indicated that water was not present or being adsorbed at various steps of the process (or during storage) that could lead to compatibility problems during pretreatment or long-term storage. The moisture content of the plutonium dioxide was analyzed by a commercial moisture analyzer. The moisture content at all steps of the process including storage averaged from 0.002% to 0.005%. The moisture content of the plutonium dioxide exposed to moist atmosphere for 7 days was 0.001%. These values indicated that no significant amount of moisture was adsorbed by the plutonium dioxide fuel charges. The only significant moisture content found was an average of 3.47%, after self-calcination. This was expected since no additional steps, other than self-heating of the fuel, are taken to remove the water. (ERA citation 05:013197)

NUREG/CR-0981 PC **A05**/MF **A01**
Battelle Columbus Labs., OH.
Evaluating Strength and Ductility of Irradiated Zircaloy. Task 5.
Progress rept. Jul-Dec 78,
L. M. Lowry, J. S. Perrin, A. J. Markworth, and W. J. Gallagher. Apr 80, 79p BMI-2020
See also PB-291 511.

Much of the data generated during the early part of this program was reported in English units. Because the data are now to be reported in System International (SI) units, this report includes a consolidation of previously reported data and conversion of that data to SI units. Included is all of the previously reported tensile, expanding mandrel and transient burst data for Sandvik, H.B. Robinson, Oconee Archive and Oconee! (one cycle) along with data generated during this reporting period. Plots of these data are also included using scales in the SI units. The discussion and evaluation of the data will be included in later reports.

NUREG/CR-1268 PC **A04**/MF **A01**
Naval Research Lab., Washington, DC.
Structural Integrity of Water Reactor Pressure Boundary Components.
Quarterly progress rept. Oct-Dec 79,
F. J. Loss. 20 Mar 80, 71p NRL-MR-4174
See also AD-A075 349.

This report describes progress in a continuing program to characterize material properties performance with respect to structural integrity of light water reactor pressure boundary components. Progress under fracture mechanics investigations includes the first J-R curve trends from A533-B weld deposit irradiated under the HSST program. A new experimental procedure was developed for the testing of 0.5T-CT specimens by the single specimen compliance technique. Fatigue crack growth rates are being determined for a variety of pressure vessel and piping steels in simulated nuclear coolant environments. New results of cyclic crack growth on several pressure vessel steels are presented along with the results of the first test of irradiated A533-B steel, tested in the high-temperature pressurized water environment. Work in radiation sensitivity and post irradiation properties recovery has embarked on phase 2 of the irradiation-anneal-reirradiation (IAR) program. Investigations were continued on the postirradiation notch sensitivity of reactor vessel steels in a coordinated IAEA program.

ORNL/TM-7182 PC **A04**/MF **A01**
Oak Ridge National Lab., TN.
Uranium Recovery from Wet-Process Phosphoric Acid with Octylphenyl Acid Phosphate. Progress Report.
W. D. Arnold, D. R. McKamey, and C. F. Baes. Jan 80, 64p
Contract W-7405-ENG-26

Studies were continued of a process for recovering uranium from wet-process phosphoric acid with octylphenyl acid phosphate (OPAP), a mixture of mono- and dioctylphenyl phosphoric acids. The mixture contained at least nine impurities, the principal one being octyl phenol, and also material that readily hydrolyzed to octyl phenol and orthophosphoric acid. The combination of mono- and dioctylphenyl phosphoric acids was the principal uranium extractant, but some of the impurities also extracted uranium. Hydroiysis of the extractant had little effect on uranium extraction, as did the presence of moderate concentrations of octyl phenol and trioctylphenyl phosphate. Diluent choice among refined kerosenes, naphthenic mixtures, and paraffinic hydrocarbons also had little effect on uranium extraction, but extraction was much lower when an aromatic diluent was used. Purified OPAP fractions were sparingly soluble in aliphatic hydrocarbon diluents. The solubility was increased by the presence of impurities such as octyl phenol, and by the addition of water or an acidic solution to the extractant-diluent mixture. In continuous stability tests, extractant loss by distribution to the aqueous phase was much less to wet-process phosphoric acid than to reagent grade acid. Uranium recovery from wet-process acid decreased steadily because of the combined effects of extractant poisoning and precipitation of the extractant as a complex with ferric iron. Unaccountable losses of organic phase volume occurred in the continuous tests. While attempts to recover the lost organic phase were unsuccessful, the test results indicate it was not lost by entrainment or dissolution in the phosphoric acid solutions. 21 figures, 8 tables. (ERA citation 05:011304)

PNL-2080-16 PC **A04**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Calculated Critical Parameters in Simple Geometries for Oxide and Nitrate Water Mixtures of U-233, U-235 and Pu-239 with Thorium. Final Report.
W. E. Converse, and S. R. Bierman. Nov 79, 74p
Contract EY-76-C-06-1830

Calculations have been performed on water mixtures of oxides and nitrates of exp 233 U, exp 235 U, and exp 239 Pu with chemically similar thorium compounds to determine critical dimensions for simple geometries (sphere, cylinder, and slab). Uranium enrichments calculated were 100%, 20%, 10%, and 5%; plutonium calculations assumed 100% exp 239 Pu. Thorium to uranium or plutonium weight ratios (Th: U or Pu) calculated were 0, 1, 4, and 8. Both bare and full water reflection conditions were calculated. The results of the calculations are plotted showing a critical dimension versus the uranium or plutonium concentration. Plots of K-infinity and material buckling for each material type are also shown. (ERA citation 05:013131)

PNL-2286 PC **A23**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Descriptions of Reference LWR Facilities for Analysis of Nuclear Fuel Cycles.
K. J. Schneider, and T. J. Kabele. Sep 79, 528p
Contract EY-76-C-06-1830

To contribute to the Department of Energy's identification of needs for improved environmental controls in nuclear fuel cycles, a study was made of a light water reactor system. A reference LWR fuel cycle was defined, and each step in this cycle was characterized by facility description and mainline and effluent treatment process performance. The reference fuel cycle uses fresh uranium in light water reactors. Final treatment and ultimate disposition of waste from the fuel cycle steps were not included, and the waste is assumed to be disposed of by approved but currently undefined means. The characterization of the reference fuel cycle system is intended as basic information for further evaluation of alternative effluent control systems. (ERA citation 05:013181)

PNL-3134 PC **A04**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Hybrid Pellets: An Improved Concept for Fabrication of Nuclear Fuel.
R. B. Matthews, and P. E. Hart. Sep 79, 56p
Contract EY-76-C-06-1830

The feasibility of fabricating fuel pellets using gel-derived microspheres as press feed was evaluated. By using gel-derived microspheres as press feed, the potential exists for eliminating dusty operations like milling, slugging, and granulation, from the pelleting process. The free-flowing character of the spheres should also result in limited dust generation during powder transport and pressing operations. The results of this study clearly demonstrate that fuel pellets can be successfully fabricated on a laboratory scale using UO sub 2 gel microspheres as press feed. Under moderate sintering conditions, 1,500 exp 0 C for 4 h in Ar-4% H sub 2 , UO sub 2 pellets with densities up to 96% TD were fabricated. A range of pellet microstructures and densities were achieved depending on sphere forming and calcining conditions. Based on these results, a set of necessary sphere properties are suggested: O/U less than 2.20, crystallite size less than 500 A, specific surface area greater than 8 m exp 2 /g, and sphere size 200 and 400 mu m. Preliminary attempts to fabricate ThO sub 2 and ThO sub 2 -UO sub 2 pellets using microspheres were unsuccessful because the requisite sphere properties were not achieved. Areas requiring additional development include: demonstration of the process on scaled-up equipment suitable for use in a remote fuel fabrication facility and evaluation of the irradiation performance of pellet fuels from gel-spheres. (ERA citation 05:011311)

RPDE-79-040 PC **A15**/MF **A01**
Westinghouse Electric Corp., Pittsburgh, PA. Nuclear Energy Systems Div.
Pneumatic Transport System Development. Final Report.
E. E. Smeltzer, D. A. Eckhardt, W. C. Yang, and M. C. Skriba. Feb 79, 348p
Contract EN-77-C-06-1058-002

Data on solids transfer rates, system reliability, residual material in the system, degree of homogeneity before and after transport of blended nuclear fuel powders, erosion in the elbows, and materials of construction were generated to provide confirmation of the design criteria necessary for

the implementation of a dilute phase pneumatic transport system in a commercial mixed oxide fuel facility. From the conclusions derived from this test program, it is recommended that a dilute phase, negative pressure driven, pneumatic transport system be retained as the design of the Recycle Fuels Plant, since it essentially fulfills all the requirements for bulk handling of fine powders in such a facility. (ERA citation 05:011312)

Y/DS-109 PC **A03**/MF **A01**
Oak Ridge Y-12 Plant, TN.
Effect of Short-Term Material Balances on the Projected Uranium Measurement Uncertainties for the Gas Centrifuge Enrichment Plant.
J. M. Younkin, and J. E. Rushton. 5 Feb 80, 26p
Contract W-7405-ENG-26

A program is under way to design an effective International Atomic Energy Agency (IAEA) safeguards system that could be applied to the Portsmouth Gas Centrifuge Enrichment Plant (GCEP). This system would integrate nuclear material accountability with containment and surveillance. Uncertainties in material balances due to errors in the measurements of the declared uranium streams have been projected on a yearly basis for GCEP under such a system in a previous study. Because of the large uranium flows, the projected balance uncertainties were, in some cases, greater than the IAEA goal quantity of 75 kg of U-235 contained in low-enriched uranium. Therefore, it was decided to investigate the benefits of material balance periods of less than a year in order to improve the sensitivity and timeliness of the nuclear material accountability system. An analysis has been made of projected uranium measurement uncertainties for various short-term material balance periods. To simplify this analysis, only a material balance around the process area is considered and only the major UF sub 6 stream measurements are included. That is, storage areas are not considered and uranium waste streams are ignored. It is also assumed that variations in the cascade inventory are negligible compared to other terms in the balance so that the results obtained in this study are independent of the absolute cascade inventory. This study is intended to provide information that will serve as the basis for the future design of a dynamic materials accounting component of the IAEA safeguards system for GCEP. (ERA citation 05:013128)

18K. Reactor Physics

BARC-989 PC **A04**/MF **A01**
Bhabha Atomic Research Centre, Bombay (India).
New Consistent Definition of the Homogenized Diffusion Coefficient of a Lattice, Limitations of the Homogenization Concept, and Discussion of Previously Defined Coefficients.
V. C. Deniz. 1978, 61p
U.S. Sales Only.

The problem concerned with the correct definition of the homogenized diffusion coefficient of a lattice, and the concurrent problem of whether or not a homogenized diffusion equation can be formally set up, is studied by a space-energy angle dependent treatment for a general lattice cell; using an operator notation which applies to any eigen-problem. It is shown that the diffusion coefficient should represent only leakage effects. A new definition of the diffusion coefficient is given, which combines within itself the individual merits of each of the two definitions of Benoist, and reduces to the 'uncorrected' Benoist coefficient in certain cases. The conditions under which a homogenized diffusion equation can be obtained are discussed. A comparison is made between the approach via a diffusion equation and the approach via the eigen-coefficients of Deniz. Previously defined diffusion coefficients are discussed, and it is shown that the transformed eigen-coefficients proposed by Gelbard and by Larsen are unsuitable as diffusion coefficients, and that the cell-edge normalization of the Bonalumi coefficient is not physically justifiable. (Atomindex citation 10:445704)

CEGB-RD/B/N-4238 PC **A02**/MF **A01**
Central Electricity Generating Board, Berkeley (England). Berkeley Nuclear Labs.
New Approach to the Calculation of Axial and Radial Neutron Diffusion Coefficients.
R. P. Hughes. Mar 78, 18p
U.S. Sales Only.

A new approach to the calculation of axial and radial diffusion coefficients is developed that introduces a new angle dependent 'transport cross-section'. Calculations are carried out using the programme WDSN(ST) for both AGR-type and SGHWR lattices. The results are compared with the standard method due to Benoist embodied in WIMS and, in the AGR case, with Monte Carlo results. The comparisons suggest major errors in the WIMS results for SGHWR clusters in the axial direction. (Atomindex citation 10:423841)

GA-A-15009(V.1) PC **A09**/MF **A01**
General Atomic Co., San Diego, CA.
MICROX-2: An Improved Two-Region Flux Spectrum Code for the Efficient Calculation of Group Cross Sections.
D. Mathews, and P. Koch. Dec 79, 178p
Contract AT03-76SF71023

The MICROX-2 code is an improved version of the MICROX code. The improvements allow MICROX-2 to be used for the efficient and rigorous preparation of broad group neutron cross sections for poorly moderated systems such as fast breeder reactors in addition to the well moderated thermal reactors for which MICROX was designed. MICROX-2 is an integral transport theory code which solves the neutron slowing down and thermalization equations on a detailed energy grid for two-region lattice cells. The fluxes in the two regions are coupled by transport corrected collision probabilities. The inner region may include two different types of grains (particles). Neutron leakage effects are treated by performing B sub 1 slowing down and P sub 0 plus DB exp 2 thermalization calculations in each region. Cell averaged diffusion coefficients are prepared with the Benoist cell homogenization prescription. (ERA citation 05:011900)

IAE-2777 PC **A03**/MF **A01**
Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Atomnoj Ehnergii.
Abstract of Programs for Nuclear Reactor Calculation and Kinetic Equations Solution.
A. A. Marakazov. 1977, 48p
In Russian.
U.S. Sales Only.

The collection includes about 50 annotations of programmes,developed in the Kurchatov Atomic Energy Institute in 1971-1976. The programmes are intended for calculating the neutron flux, for solving systems of multigroup equations in P sub 3 approximation, for calculating the reactor cell, for analysing the system stability, breeding ratio etc. The programme annotations are compiled according to the following diagram: 1.Programme title. 2.Computer type. 3.Physical problem. 4.Solution method. 5.Calculation limitations. 6.Characteristic computer time. 7.Programme characteristic features. 8.Bound programmes. 9.Programme state. 10.Literature allusions in the programme. 11.Required memory resourses. 12.Programming language. 13.Operation system. 14.Names of authors and place of programme adjusting. (Atomindex citation 10:437902)

IAE-2803 PC **A02**/MF **A01**
Gosudarstvennyi Komitet po Ispol'zovaniyu Atomnoi Energii SSSR, Moscow. Inst. Atomnoi Energii.
VAK Code for the Physical Calculation of a Three-Dimensional Nuclear Reactor in the Diffusion Approximation Using a BESM-6 Computer.
V. A. Karpov. 1977, 16p
In Russian.
U.S. Sales Only.

A method is described to calculate Ksub(ef) and the spatial-energy distributions of neutrons in the multizone HTGR type reactors. The diffusion algorithm is drawn in terms of the finite difference method to compute the three-dimensional elliptical equations. The numerical solution is realized by mixed iterations using the Yang-Frankel method. The algorithm is translated into action through the VAK code written in FORTRAN for a BESM-6 computer. The code does not limit the number of planes of node points along the reactor axis. When calculating in the two-group diffusion approximation the maximum number of nodes per plane is 4000. The physical model of neutron diffusion put into the VAK code can be used to calculate physical parameters of different nuclear reactors unless the diffusion approximation is valid. (Atomindex citation 10:433509)

IEA-494 PC **A03**/MF **A01**
Instituto de Energia Atomica, Sao Paulo (Brazil). Div. de Engenharia Nuclear.
Numerical Solutions of Two-Media Problems in Two-Group Neutron Transport Theory.
Y. Ishiguro, and R. D. M. Garcia. Jan 78, 49p
U.S. Sales Only.

Three problems involving two media in plane geometry are solved numerically in two-group neutron transport theory for isotropic scattering: two slabs with an incident flux, the critical problem for reflected slab reactors, and the cell problem. Each problem is reduced to a set of regular integral equations for the coefficients of the Case expansions an solved iteratively. Numerical results are reported for all problems. (Atomindex citation 09:418480)

IKE-6-120 PC **A02**/MF **A01**
Stuttgart Univ. (TH) (Germany, F.R.). Inst. fuer Kernenergetik und Energiesysteme.
Test of a Simple Implicit Method for the Numerical Integration of Neutron Kinetics Equations.
D. Emendoerfer, and K. Neumann. Sep 78, 24p
In German.
U.S. Sales Only.

On the basis of the integro-differential equation of neutron kinetics a recursion formula is deduced which allows a successive numerical integration of the kinetic equation for arbitrary continuous reactivity changer using an implicit method. The quality of the numerical solutions is tested as a function of the time step width and by comparison with analytic solutions of charakteristic special cases. It is found that the method gives relatively precise and stable solutions. In the region of large power overflows, large step sizes result in an overestimation of the power peaks, and thus in conservative results in view of the safety investigations. (Atomindex citation 10:445706)

INIS-mf-4983 PC **A02**/MF **A01**
Institutul de Fizica si Inginerie Nucleara, Bucharest (Romania).
Contributions to the Elaboration of a Nuclear Data Set for Fast Reactors.
Thesis (D.S.),
I. Petre. 1977, 23p
In Romanian.
U.S. Sales Only.

A set of nuclear data was calculated for fast reactors based on an "optimum agreement" with experimental data. It allows a better approach to a fast reactor project, since both integral and differential data were employed to draw it up. The mathematical method used consists in modifying differential data in view of obtaining a minimum disparity between integral calculated and measured values. The original contribution of the thesis lies in a statistical substantiation of the calculation method. For this purpose, a minimum theorem was demonstrated and the statistical behaviour of the Lagrange multipliers vector as well as the section estimated set were investigated, demonstrating the character of non-biassed estimator. There were also contributions to the formalism for sensitivity coefficients by developing the variational method, generalizing the Swanlake method and writing the sensitivity calculations under a form consistent with the ANISN code. In the last part, the calculation code for the improved nuclear data set is presented using element U exp 235 as a calculating example. The code was run on IBM-370 and PDP-15 computers (with a limited number of integral data). Section corrections for ZPR-III systems of 400 Kg, 200 Kg and 150 Kg critical mass were calculated. (Atomindex citation 10:461780)

LA-8135-PR PC **A05**/MF **A01**
Los Alamos Scientific Lab., NM.
Transport and Reactor Theory, July 1-September 30, 1979.
D. J. Dudziak, R. D. O'Dell, and R. E. Alcouffe.
Nov 79, 76p

Contract W-7405-ENG-36

Research and development progress in transport and reactor theory by the Los Alamos Scientific Laboratory's Group T-1 for the fourth quarter of FY 79 is reported. Included are tasks in the areas of Fission Reactor Neutronics Transport Methods Supporting Research, Reactor Safety Analysis, Fusion Reactor Nucleonics, Shielding Methods, and Safeguards Analysis. (ERA citation 05:011901)

PB80-170459 PC **A03**/MF **A01**
Netherlands Energy Research Foundation ECN, Petten.
The Contribution of (n,p) and (n,alpha) Reactions to Fission-Product Capture Cross Sections,
H. Gruppelaar, and B.P.J. van den Bos. Oct 79, 36p ECN-78

In recent fission-product cross section libraries, evaluated (n,p) and (n,alpha) cross sections are lacking for most of the nuclides. To estimate these cross sections, calculations have been performed with a semi-empirical model. The calculated excitation functions were renormalized at 14.5 MeV to experimental data, recently compiled by Qaim, or to date from recent systematics of Kumabe and Fukuda. The shapes of the excitation functions were checked against available experimental data. Group cross sections of pseudo fission products for a fast power reactor at a burn-up of 41 MWd/kg have been calculated.

PEL-261 PC **A02**/MF **A01**
Atomic Energy Board, Pelindaba, Pretoria (South Africa).
Single-Angle Neutron Scattering Facility at Pelindaba.
C. Hofmeyr, R. M. Mayer, D. L. Tillwick, and J. R. Starkey. May 78, 22p
U.S. Sales Only.

The small-angle neutron scattering facility at the SAFARI-1 reactor is described in detail, and with reference to theoretical and practical design considerations. Inexpensive copper microwave guides used as a guide-pipe for slow neutrons provided the basis for a useful though comparatively simple facility. The neutron-spectrum characteristics of the final facility inn different configurations of the guide-pipe (both S and single-curved) agree well with expected values based on results obtained with a test facility. The design, construction, installation and alignment of various components of the facility are outlined, as well as intensity optimisation. A general description is given of experimental procedures and data-aquisition electronics for the four-position sample holder and counter array of up to 18 exp 3 He detectors and a beam monitor. (Atomindex citation 09:412068)

18M. Reactors (Non-Power)

FEI-807 PC **A02**/MF **A01**
Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Obninsk. Fiziko-Ehnergeticheskij Inst.
Theoretical and Experimental Investigation of the Temperature Effect of Heterogeneous Assemblies with a Heavily Blocked Absorber.
V. I. Bagretsov, V. I. Lependin, V. I. Matveenko, and V. N. Morozov. 1978, 13p
In Russian.
U.S. Sales Only.

Techniques for measuring and calculating the temperature dependence of reactivity of regular heterogeneous uranium-water critical assemblies are shortly described. The experiments were conducted in the temperature range from 20 to 240 deg C with three types of the critical assemblies differing in the number of fuel elements, structural materials and neutron absorbers (gadolinium or cadmium oxides). Two experimental techniques were used: measuring the drho/dT=f(T) dependence with subsequent integration and measuring reactivity of the system in a subcritical reactor by the pulse alpha method (alpha -damping decrement of prompt neutron flux). The calculations were performed in a two-group diffusion approximation using the Ssub(n) method to determine thermal neutron constants. It is concluded that the calculated and experimental techniques proposed are adequate to study the regular assemblies with heavily blocked neutron absorbers. (Atomindex citation 10:445700)

HEDL-SA-1795 PC **A10**/MF **A01**
Hanford Engineering Development Lab., Richland, WA.
FFTF Status and Test Results.
B. H. Noordhoff. Apr 79, 219p CONF-7904117-1
Contract EY-76-C-14-2170
American Nuclear Society meeting, Los Angeles, CA, USA, 19 Apr 1979, Portions of document illegible.

A general description of the FFTF is presented concerning the construction progress; status of startup and selected startup test results; and planned experiment program during and subsequent to the startup testing program. The FFTF is a 400 MWt, sodium cooled test reactor plant consisting of a fast-neutron reactor fueled by mixed plutonium oxide-uranium oxide fuel elements, three independent heat transport loops, extensive instrumentation, fuel handling equipment, and auxiliary systems which support the main reactor and cooling systems. The FFTF contains no steam generators, electrical generating equipment, or breeding blankets. Heat generated in the reactor is released to the ambient atmosphere by twelve large sodium-to-air heat exchangers. (ERA citation 05:008517)

IAE-2775 PC **A02**/MF **A01**
Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Atomnoj Ehnergii.
Thermal Neutron Pulse Source with Maximum Flux.
N. I. Alekseev, A. S. Kochenov, I. P. Sadikov, and V. S. Stolypin. 1977, 24p
In Russian.
U.S. Sales Only.

Considered are the possibilities to obtain limiting peak fluxes of thermal neutrons in subcritical assembly (booster) with an interanl pulse source. It is shown that at the booster operation in the separate pulse regime and with the application of a high-energy approximately 600 MeV heavy-current proton pulse accelerator (pulse current approximately 50 mA) with proton pulse duration of approximately 100 mu s, and using PuO sub 2 as fuel, is it possible to obtain in a light water trap the peak current of thermal neutrons of approximately 6.0x10 exp 18 n/cm exp 2 xs with effective pulse width of approximately 200 mu s at the frequency of 3 pulse/h and maximum fuel heating by approximately 1200 deg C. Heat transfer intensification at the expense of water introduction into the core in the quantity of 25% from its volume permits to increase the pulse frequency by approximately 1000 times at the flux decrease only by approximtely 2 times. Energy release flattening and maximum fuel heating up to 2000 deg C permits to obtain the pulse flux of thermal neutrons in the trap of approximately 2x10 exp 19 n/cm exp 2 xs which coincides with the limiting flux in the core. Using UO sub 2 the limiting flux is also equal to approximately 2x10 exp 19 n/cm exp 2 xs however to obtaine it, it is necessary to use the neutron injector with the power exceeding by approximately 7 times that of the neutron injector. (Atomindex citation 10:445455)

IEA-DT-064 PC **A05**/MF **A01**
Instituto de Energia Atomica, Sao Paulo (Brazil).
Radiation Levels in the Pool Surface of IEA-R1 Reactor.
Tese(M.Sc.),
H. Pasqualetto. Jul 78, 85p
In Portuguese.
U.S. Sales Only.

A theoretical model for the calculation of the radioactivity level in the pool surface of the research reactor IEA-RI (INSTITUTO DE ENERGIA ATOMICA, BRAZIL) is developed. The radioactivity is caused by radionuclides (Mainly exp 24 Na and exp 27 Mg) produced by nuclear reactions of neutrons with: a) oxygen of the water b); gaseous elements dissolved in water (Ar,N); c) structural materials of the fuel can. Considerations about expected radiation level after eventual increase of reactor power from 2 MW to 10 MW are also presented. (Atomindex citation 10:441890)

ILL-RA-1976 PC **A08**/MF **A01**
Institut Max von Laue - Paul Langevin, Grenoble (France).
ILL Annual Report 1976.
151p
U.S. Sales Only.

In 1976 the three major functions of ILL continued to be generally satisfactorily performed (provision of neutron beams at the high flux reactor, development of advanced instrumentation, establishment of a forum). The implementation of the programme of measurements approved by the Scientific Council was again given absolute priority. This report gives a survey of the state of the experimental facilities at ILL and the scientific work carried out in 1976, and of the main technical and administrative activities of the Institute. (Atomindex citation 10:463853)

JAPFNR-479 PC **A05**/MF **A01**
Power Reactor and Nuclear Fuel Development Corp., Oarai (Japan).
Study on Plan of Mock-Up Critical Experiment for Large Fast Reactors by Using the FCA. (Study on an Amount of Pu Fuel Needed for Partial Mock-Up Experiment in Large Fast Reactors).
H. Takano, H. Mitani, Y. Matsui, Y. Ishiguro, and H. Kuroi. Jul 79, 84p PNC-SJ-250-79-18, JAERI-Memo-8362
In English and Japanese.Work performed under United States–Japanese Fast Reactor Exchange Program.
U.S. Sales Only.

Study on Pu-contents needed for partial mock-up experiment in large fast reactors was performed by considering zone loading, sector loading, and partial sum mock-up methods. Integral quantities, i.e., central reaction rate ratio, reaction rate distribution, Doppler reactivity coefficient, Na-void reactivity and control rod reactivity were calculated for full mock-up and these partial mock-up cores with various Pu-contents. (ERA citation 05:011890)

KURRI-TR-164 PC **A03**/MF **A01**
Kyoto Univ., Kumatori, Osaka (Japan). Research Reactor Inst.
Simulation Test for Automatic Control of Two-Sectional Core Reactor Using Analog Computer.
S. Yamamoto. Oct 77, 26p
In Japanese.
U.S. Sales Only.

The high neutron flux reactor being planned as the second reactor in the Research Reactor Institute, Kyoto University, has two-sectional core construction with light water moderation and heavy water reflector. Its constant output control is performed so as to make the neutron flux of each reactor core constant. Each core is provided with an automatic control system. The dynamic characteristics of the two-sectional core were analyzed and treated, using one group two point approximation. The control system of each core is composed of PI controller, Up-down relay, control rod-driving motor and control rod position feedback system. Analog computer simulation was conducted on these control systems, in which the output changes in both cores were observed when stepped reactivity disturbance was given to one core in steady operation. In coupling of approximately 10 to 50 of K/I, the ratio of coupling coefficient K to neutron lifetime l, any problem due to interference between the control systems for both cores seems not to occur. Coupling of approximately 50 of K/I is not sufficient for changing the control systems to one system regarding the reactor cores as single core. Prior to the above testing, experiments for single core were carried out, and the results are described at the end of the paper as the appendix. (Atomindex citation 10:437976)

NIIAR-P-7(301) PC **A02**/MF **A01**
Nauchno-Issledovatel'skii Inst. Atomnykh Reaktorov, Dimitrovgrad (USSR).
Economic Estimate of the Test Reactor Exploitation Efficiency.
V. N. Brun, and E. V. Kirillov. 1977, 16p
In Russian.
U.S. Sales Only.

The specific features are shown of scientific researches on the experimental reactor which is ac-

tually a multipurpose test-experimental plant intended for gaining experience in operation of a new type reactor under the NPP conditions. There is described a principal approach to estimation of the economic efficiency of these researches. There is suggested a parameter which provides for quantitative estimation of the efficient use of the experimental opportunities of the entire reactor. This parameter is represented by the relative scope of the experimental operations on the plant per unit expenditure. This parameter makes it possible to estimate the degree of use of the existing experimental opportunities of the plant and efficiency of the measures aimed at extension of these opportunities. With the use of this parameter, it will not be difficult to determine the absolute value of the economic effect. (Atomindex citation 10:421487)

18N. Snap Technology

LA-8083 PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
Microstructural Damage Produced by Helium in Aged exp 238 PuO sub 2 Fuels.
C. C. Land. Jan 80, 15p
Contract W-7405-ENG-36

Microstructural damage is produced in aged exp 238 PuO sub 2 fuels used to power radioisotopic heat sources by the generation and release of the helium arising from alpha decay of the fuel. We obtained information about the nature and extent of this damage from metallographic examination of fuel pellets ranging in density from 87 to 94% with a grain size range of 6 to 30 mu m that either were stored at ambient temperature for 18 months and then heated at 900, 1150, or 1360 exp 0 C or were stored at 900, 1150, or 1350 exp 0 C for 27 months. Microstructural damage was not observed in the fuel pellets stored at ambient temperature and then heated at 900 exp 0 C, but grain boundary bubble damage was observed in the pellets stored at ambient temperature and then heated at either 1150 or 1350 exp 0 C. More extensive damage occurred in those pellets heated at 1350 exp 0 C. Four of the higher density pellets (92 and 94% dense) stored at 900 exp 0 C shattered during storage and the rest appeared to be highly strained. The pellets stored at 1150 exp 0 C were damaged only slightly but were somewhat strained and appeared to have released their helium inventory only partially. All pellets stored at 1350 exp 0 C showed swelling and extensive void agglomeration. These data suggest that the best fuel operating temperature, as far as helium damage is concerned, would be approx. 1200 exp 0 C because below this temperature the fuel becomes highly strained and above this temperature the fuel swells ad becomes somewhat friable. Both these situations could adversely affect the impact behavior of the fuel from the standpoint of strength and fines generation. (ERA citation 05:013916)

19. ORDNANCE

19A. Ammunition, Explosives, and Pyrotechnics

AD-A082 769/1 PC **A07**/MF **A01**
RCA Government Systems Div Burlington MA
Interface Circuit 11726909 Materials, Methods, and Technology Program.
Final technical rept.,
J. G. Bouchard, J. A. Brady, and B. T. Joyce. Jan 80, 136p HDL-CR-80-002-1
Contract DAAG39-78-C-0002

This report summarizes a materials, methods, and technology program associated with a hybrid microelectronic, special-purpose interface circuit for use in the M587 and M724 Electronic Timing Fuzes. The pilot production phase of this 4-phase program provided operation rates and yield data necessary to make realistic cost estimates of high-volume production of this hybrid. To help reduce production costs, this hybrid interface circuit employs a custom-designed monolithic integrated circuit. Transfer molding packaging techniques were developed to meet demanding environment requirements that include 30 KG mechanical shock. (Author)

AD-A082 804/6 PC **A07**/MF **A01**
Army Armament Research and Development Command Aberdeen Proving Ground MD Ballistics Research Lab
the BRL 7600 Version of the HELP Code.
technical rept.,
joseph Lacetera, Janet E. Lacetera, and James A. Schmitt. Jan 80, 142p ARBRL-TR-02209, AD-E430 387

The HELP computer code (BRLHELP) which is maintained on the CDC 7600 computers at the Ballistic Research Laboratory, Aberdeen Proving Ground, Maryland and the Ballistic Missile Defense Advanced Technology Center in Huntsville, Alabama, is described. Three shaped charge design applications, a 43 mm conical shaped charge, a hemispherical shaped charge, and an impacting copper wedge, are discussed. Input decks and selected output for each problem are listed, and results are compared with experiments. The energy formulation in the HELP code is analyzed and the cause of the unphysical internal energy values is identified.

AD-A082 893/9 PC **A04**/MF **A01**
SRI International Menlo Park CA Chemistry Lab
Desensitization of Explosive Materials.
Final rept. 15 May 76-14 Oct 79,
Marion E. Hill, and John M. Guimont. Dec 79, 75p
Contract N00014-76-C-0810

the desensitization of explosive compounds has been studied by the synthesis and testing of analogs of selected molecular structures in which part of the hydrogen has been replaced by fluorine. The objectives were to demonstrate whether or not 'chemical desensitization' could be achieved with fluorine in specific positions and groupings, to infer from the results how the fluorine affected the initiation process, and to permit the design and synthesis of high energy and relatively insensitive compounds. (Author)

LA-UR-79-3257 PC **A03**/MF **A01**
Los Alamos Scientific Lab., NM.
Flowing Afterglow Spectroscopy: An Ultrasensitive Probe into Solid-Phase Decomposition Kinetics.
G. W. Taylor, and G. H. Andrews, Jr. 1979, 30p CONF-7905125-1
Contract W-7405-ENG-36
Symposium on chemical problems connected with the stability of explosives, Bostod, Sweden, May 1979.

The thermal-decomposition kinetics of high explosives are important to manufacturers and these dangerous materials from the standpoint of processing and storage. Low-temperature kinetics (20 to 200 exp 0 C) are difficult to obtain. Either extremely sensitive analytical techniques must be employed or very large amounts of material must be tested by less sensitive methods. The latter technique has the disadvantage that when sensitive explosives or propellants are so tested, catastrophic reaction can result in the destruction of expensive equipment, and the time involved in testing may be extremely long. The flowing-afterglow method, proposed here, utilizes small explosive samples and an ultra-sensitive analytical approach. The paper describes the technique in detail and summarizes our recent efforts to elucidate the low-temperature kinetics of trinitrotriaminobenzene (TATB) and nitroguanidine. (ERA citation 05:009039)

LA-UR-80-56 PC **A03**/MF **A01**
Los Alamos Scientific Lab., NM.
Flowing Afterglow Spectroscopy: An Ultrasensitive Probe into Solid-Phase Decomposition Kinetics.
G. W. Taylor, and G. H. Andrews, Jr. 1979, 30p CONF-791079-3
Contract W-7405-ENG-36
DOE compatibility meeting, Aiken, SC, USA, 16 Oct 1979.

The thermal-decomposition kinetics of high explosives are important to manufacturers and handlers of these dangerous materials from the standpoint of processing and storage. Two broad temperature regions are of particular importance, i.e., the high (greater than or equal to 200 exp 0 C) temperature region associated with fire hazard and the low (approx. 20 to 200 exp 0 C) region associated with storage and processing environments. The paper describes the technique in detail and summarizes recent efforts to elucidate the low-temperature kinetics of trinitrotriaminobenzene (TATB) and nitroguanidine. (ERA citation 05:014135)

LA-8124-MS PC **A03**/MF **A01**
Los Alamos Scientific Lab., NM.
Explosives Research and Development: Recommendations and Comments on Unsolved Problems.
L. C. Smith. Nov 79, 46p
Contract W-7405-ENG-36

Historical highlights and the current status of the science of high explosives are briefly reviewed, and recommendations and comments on areas deserving special attention during the next decade or so are offered. (ERA citation 05:012398)

MHSMP-80-03 PC **A02**/MF **A01**
Mason and Hanger-Silas Mason Co., Inc., Amarillo, TX.
Recrystallization of TATB for Analytical Standard.
C. L. Schaffer. Jan 80, 8p
Contract EY-76-C-04-0487

A 780 g analytical standard of TATB was prepared by recrystallization from reagent grade dimethylformamide. The resulting recrystallized product appears to be the purest TATB produced to date, in larger than gram quantities. The average assay of seven samples was 99.98% with a standard deviation of 0.29%. (ERA citation 05:012399)

MLM-2662(TR) PC **A02**/MF **A01**
Relationship Between Electron Structure and the Sensitivity of Secondary Nitro Explosives: Molecular Criteria of Sensitivity. Part 1. Nitroaromatics and Nitramines.
A. Delpuech, and J. Cherville. 1978, 19p
Contract EY-76-C-04-0789
A, Propellants Explos. 3 P169-175 1978.

The paper is the first of a series in which an attempt is made to establish a relation between shock sensitiveness of secondary explosives and their electronic structure. In the case of nitroaromatics and nitramines, the preferential action of a R-NO sub 2 bond of the molecule is made evident in the course of the initiation of the detonation. The examination of the modifications undergone by the electronic distribution of this bond after the absorption of energy enables to determine a parameter perfectly correlated with the scale of experimental sensitivities. The validity of this parameter as a criterion of sensitiveness demonstrates the existence of an excited state before detonation. (ERA citation 05:012401)

N80-20403/5 PC **A03**/MF **A01**
Indian Inst. of Science, Bangalore. High Energy solids Lab.
Thermal Decomposition and Combustion Studies on Potassium Perchlorate/Polystyrene Propellant Systems.
K. Kishore, V. R. P. Verneker, and M. R. Sunitha. 12 Jun 79, 37p LOG-J11458
Backup Document for Aiaa Synoptic Scheduled for Publication in Aiaa Journal in Aug. Or Sep. 1980.

The thermal decomposition (TD) behavior of potassium perchlorate (KP) polystyrene (PS) system was studied in detail as well as the occurance of condensed-phase reactions in KP/PS propellant combustion. The TD and Combustion behavior of KP/PS propellant system was compared to that of ammonium perclorate/PS. Significant results are reported.

PAT-APPL-6-089 832 PC **A02**/MF **A01**
Department of the Army Washington DC
Improved Pyrotechnic Fuel.
Patent Application,
J. Richard Ward. Filed 31 Oct 79, 21p AD-D007 106/8
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

An improved pyrotechnic composition having a metal pyrotechnic fuel and an oxidizer for produc-

ing light, heat, smoke and sound from an exothermic reaction wherein the improvement comprises the use of a metal hydride as the pyrotechnic fuel to provide rapid ignition and reduced burning rates with high metal content for increased luminous efficiency. The metal hydride fuels are selected from groups consisting of magnesium hydride (MgH2), titanium hydride (TiH2), lithium aluminum hydride (LiAlH4) and sodium borohydride (NaBH4). The principal object of this invention is to provide an improved pyrotechnic composition of increased luminous efficiency which is easier to ignite and which has a reduced pyrotechnic burning rate with high metal content. It is another object of this invention to provide an improved pyrotechnic fuel comprising a metal hydride for use in artillery, tank cannon and small arms projectiles. It is a further object of this invention to provide an improved pyrotechnic fuel ingredient for use in rocket motor igniters to provide more reliable ignition than conventional known based igniters. It is a still further object of this invention to provide an improved pyrotechnic fuel mix for use in the base of projectiles as 'fumers' or 'based-bleed' materials to reduce the projectile's base drag for easier ignition and higher specific impulse than conventional fuel mixes. It is another object of this invention for an improved fuel for use in solid fuel ramjet for easier ignition and higher specific impulse than conventional magnesium based fuels.

PAT-APPL-6-112 587 PC **A02**/MF **A01**
Department of the Army Washington DC
Preparation of HNS from HNBB Using Oxygen.
Patent Application,
Everett E. Gilbert. Filed 16 Jan 80, 12p AD-D007 097/9
availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A process for preparing 2,2',4,4',6,6'-hexanitrostilbene in high yields by reacting 2,2',4,4',6,6'-hexanitrobibenzyl in a suitable solvent with an oxygen-containing gas in the presence of a catalyst. The catalyst is selected from the group consisting of copper ammino and cobalt ammino compounds, copper and cobalt acetates, copper and cobalt halides, copper sulfate, and ammonium and alkali metal bases. It is an object of the present invention to provide a process for preparing 2,2',4,4',6,6'-hexanitrostilbene (HNS) in high yields through the oxidation of 2,2',4,4',6,6'-hexanitrobibenzyl (HNBB). It is a further object of this invention to provide a process for the preparation of HNS through oxidation of HNBB with an oxygen containing gas without requiring the use of methanol, potassium hydroxide, pyridine and other solvents essential in the Kompolthy et al process discussed above. It is a still further object of this invention to provide a process for preparing 2,2',4,4',6,6'-hexanitrostilbene through oxidation of HNBB with oxygen-containing gas in increased yields through addition of small amounts of a catalyst. These and other objects of the invention will be apparent from the detailed description of the invention. (Author)

PAT-APPL-6-115 819 PC **A02**/MF **A01**
Department of the Army Washington DC
Kinetic Sabot System.
Patent Application,
Thomas R. Jeter. Filed 28 Jan 80, 10p AD-D007 094/6
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

The disadvantages of the systems of the prior art are overcome through the use of a projectile-sabot system by measn of which, spin is imparted to the projectile within a smooth-bore barrel. The sabot, which substantially encloses the projectile, has a forward flange section which includes a plurality of nozzles which cause the sabot to operate as a centrifugal turbine. The sabot has grooves or slots on interior and /or exterior surfaces which fracture under the centrifugal forces whcih exist when the projectile-sabot system exists the smooth-bore barrel, thereby permitting the projectile to separate from the sabot after the desired spin has been imparted to the projectile. (Author)

PAT-APPL-6-115 820 PC **A02**/MF **A01**
Department of the Army Washington DC
Propellant Charge for Blank Ammunition.
Patent Application,
Bruce W. Brodman. Filed 28 Jan 80, 8p AD-D007 093/8
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

Accordingly, an object of the present invention is to provide small caliber blank cartridges with near constant ignition and combustion characteristics irrespective of the attitude of the cartridges at firing; a propellant charge capable of high gas generation rates upon ignition; and in which additional propellant cannot be deliberately or inadvertently added to the cartridge after it is loaded. The cartridge includes a hollow, cylindrically walled case, which is open at one end and terminates at a head at the other. An integrated porous propellant charge is placed within the case and a wad mounted to secure the charge within. (Author)

PNL-3246 PC **A04**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Nondestructive Testing of 105MM Depleted Uranium Penetrators.
C. J. Morris, and S. J. Foreman. Dec 79, 71p
Contract EY-76-C-06-1830

The report is an information update concerning the nondestructive testing (NDT) activities at Pacific Northwest Laboratories (PNL) for depleted uranium penetrator (XM774, XM833) quality inspection and evaluation. This report covers NDT activities from August to November, 1979. (ERA citation 05:012271)

UCID-18297 PC **A02**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Preparation of Candidate Energetic Materials for Munition Acceleration.
H. C. Hornig, G. L. Moody, R. M. Boat, and K. V. Fordyce. 22 Oct 79, 8p
Contract W-7405-ENG-48

A small task was undertaken to supply candidate propellants or explosives to the Tomahawk program covering a wide range of explosiveness. Small discs of material were needed for a screening test to determine the ability of the propellant or explosive to accelerate a munition to about 60 m/s (200 ft/s) with an explosive-like reaction without damaging the munition. The scheme was an alternative to more conventional solid propellant motors. A preliminary trial with C-4 explosive was very promising but caused some damage to the munition. The strategy in this task was to select energetic composite explosives and propellants which varied in their tendency to detonate and could be expected to react in a vigorous deflagration or weak detonation. (ERA citation 05:012400)

UCID-18534 PC **A03**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Preliminary Development and Characterization of a TATB/HMX Plastic-Bonded Explosive.
H. C. Hornig, and R. R. McGuire. Jan 80, 26p
Contract W-7405-ENG-48

Three new explosives were devised, prepared, and partially characterized in an attempt to find a favorable compromise between the extreme safety but modest detonation performance of TATB and the modest safety but excellent detonation performance of HMX. The three new formulations were all TATB/HMX/Binder - 45/48.5/6.5 vol % with Viton A and Kraton-1650 used as binders, and with two granulations of HMX, Class E, and LX-04 grade. In safety tests with frictional impact such as Susan and bullet tests, the new explosives resemble TATB-based explosive with high threshold and low reactivity. In high-temperature tests, the threshold temperature is similar to that for HMX-based explosive; but the reactions are mild, resembling TATB-based explosive. When the explosive is heated and confined under pressure, these reactions result in a gas rupture of the pressure vessel. Initiation to detonation from the strong short shock of a thin flyer plate resembles HMX-based explosive; but in the small-scale gap test, the materials behave similarly to Composition B. The effect of the smaller particle size of Class E HMX was barely discernible in some tests and undetected in others. Cylinder test energy and the equation of state is similar to that of Composition B, and calculations indicate that energy is linear with HMX concentration. Most safety properties are non-linear, and these materials are substantially safer than Composition B under accident-type stimuli tested to date. The family offers an unusual opportunity for tailoring or trading off properties because, in reference to HMX concentration, energy is linear, hazard properties seem to be on the less sensitive or TATB side of linear, and strong shock initiation seems to be on the more sensitive or HMX side of linear. (ERA citation 05:014136)

UCRL-15160 PC **A03**/MF **A01**
SRI International, Menlo Park, CA.
Fracture and Fragmentation of High Energy Propellant.
W. J. Murri, Y. M. Gupta, and D. R. Curran. Apr 79, 48p
Contract W-7405-ENG-48

Experimental and analytical studies on dynamic fracture and fragmentation of VRA high energy propellant are reported. The overall purpose is to develop a predictive model for fracture, and fragmentation, and associated formation of new surface area during dynamic loading. (ERA citation 05:012214)

UCRL-82731 PC **A02**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
In Situ Fracture Related to Energy and Resource Recovery.
R. N. Schock, M. E. Hanson, R. P. Swift, and O. R. Walton. 1979, 16p CONF-790709-19
Contract W-7405-ENG-48
VII international AIRAPT conference, La Creusot, France, 30 Jul 1979.

Many resources require fracturing of rock before recovery. This is often accomplished by energy deposition under in situ conditions. The mechanical properties of the medium, confining pressure, pore fluid pressure, temperature, and energy deposition rate are among the important factors leading to an understanding and prediction of fracture production. Recent experimental and modeling studies have improved understanding of the effects of confining pressure on explosive-induced fracturing in small-scale blocks, effect of timing of multiple explosives, rate of pressurization on hydraulic fracture production, changing material properties on hydraulic pressure-produced fracture initiation and orientation, and material properties on rubble behavior after fracturing. (ERA citation 05:011173)

19C. Combat Vehicles

AD-A082 715/4 PC **A03**/MF **A01**
Army Materiel Systems Analysis Activity Aberdeen Proving Ground MD
Survey of Rust Damage to the M880 Series, 1-1/4 Ton Truck.
Technical rept.,
Harold T. Lootens. Jan 80, 48p Rept no. AMSAA-TR-291

This report presents the results of a survey to determine the severity of rust damage on the M880 series, 1-1/4 ton truck. The adequacy of contractor applied rustproofing is assessed and recommendations are made to improve the present condition of the fleet and prevent further rust damage. (Author)

19D. Explosions, Ballistics, and Armor

AD-A082 693/3 PC **A03**/MF **A01**
Atomic Weapons Research Establishment Aldermaston (England)
The Foulness Multiton Air Blast Simulator. Part 3. Blast Wave Formation and Methods Used to Drive the Simulator,
Pamela M. Clare. Mar 80, 34p Rept no. AWRE-O-3/80
See also Part 2, AD-B025 777.

The various techniques used to drive the Foulness multiton air blast simulator and obtain optimum performance are described. These involve boost-

ing the total energy release of the explosive driver using expanded polystyrene and at the same time, controlling the rate of release. The part played by aqueous foam in minimising irregularities in waveform also is described. (Author)

AD-A082 800/4 PC **A03**/MF **A01**
General Electric Co Albuquerque NM Tempo
Photogrammetry of the Particle Trajectories on Dipole West Shots 8, 9, 10, and 11. Volume V. Comparison of Results.
Final rept. 1 Mar-30 Nov 78,
J. M. Dewey, and D. J. McMillin. 30 Nov 79, 50p
DNA-4326F-5, AD-E300 699
Contract DNA001-77-C-0305
Prepared in cooperation with Victoria Univ. (British Columbia). See also Volume 1, AD-A051 288.

Volume V, the final volume of this series, compares the results obtained by photogrammetry of smoke-puff particle flow tracers in four experiments (DIPOLE WEST Shots 8 to 11) involving the simultaneous detonation of pairs of 1080-lb (490-kg) Pentolite charges. In Shots 8 and 11, one charge was at a height of 25 feet (7.6m) above the ground, and the second charge was 50 feet (15.2m) above the first. The corresponding distances for Shots 9 and 10 were 15 feet (4.6m) and 30 feet (9.2m). For Shots 8 and 9, the ground surface was smooth, and for Shots 10 and 11, the ground close to the charges was roughened by ploughing to a depth of approximately 14 inches (35 cm). The analysis of the photographically observed particle trajectories in the blast waves of each experiment provided information on the strengths of the primary and Mach stem shock waves, and a measure of the space and time variations of particle velocity, density, hydrostatic overpressure and dynamic pressure in the blast waves. Comparisons between these results from the four experiments show complete consistency in the trajectories of the primary shocks from all eight charges, indicating that they all detonated satisfactorily with equal energy yields. The measurements of the Mach stem blast waves above and below the horizontal interaction planes between the pairs of charges provide a set of 'ideal' values against which to compare blast wave reflections from real ground surfaces.

AD-A082 869/9 Not available NTIS
Defence Research Establishment Valcartier (Quebec)
Minimizing Effects of Reflected Shocks in Ballistic Ranges,
D. Heckman, J. Williams, W. Robertson, and A. Emond. 11 Feb 73, 14p DRB-REPRINT-4036
Availability: Pub. in IEEE Transactions on Aerospace and Electronic Systems, vAES-10 n4 p458-470 Jul 74 (No copies furnished by DTIC/NTIS).

No abstract available.

LA-UR-79-3106 PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
Primer on SDT, DDT, XDT, Pickup, and Sympathetic Detonation.
L. C. Smith, and B. G. Craig. 1979, 13p CONF-790975-4
Contract W-7405-ENG-36
CPIA-JANNAF combustion conference, Monterey, CA, USA, 10 Sep 1979.

The basic principles and causes of accidental explosions are described. (ERA citation 05:009038)

LA-7989 PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
Numerical Modeling of Sympathetic Detonation.
A. L. Bowman, J. D. Kershner, and C. L. Mader. Nov 79, 22p
Contract W-7405-ENG-36

The sympathetic detonation of small cubes of solid rocket propellant was modeled numerically, using the Eulerian reactive hydrodynamic code 2DE with Forest Fire burn rates. The model was applied to cubes of 1 to 3 in., with excellent agreement between calculated and experimental results. The model also was applied to several propellants and to different experimental arrangements. The blast-wave pressures in the air gap and the induced shock pressures in the acceptor were obtained from the model. The correlation between these pressures was coupled with a study of the effect of the length-to-diameter ratio of a donor cylinder and the necessary conditions for detonation of the acceptor to provide a semiquantitative predictive capability. (ERA citation 05:012397)

19F. Guns

UCRL-83063 PC **A02**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Modeling Particulate Additive Influences and Transport at Gun Barrel Walls.
A. C. Buckingham. 28 Jan 80, 20p CONF-800308-1
Contract W-7405-ENG-48
JANNAF propulsion meeting, Monterey, CA, USA, 11 Mar 1980.

Numerical modeling is applied to simulate the influence of particles on erosive transport in a turbulent reactive boundary layer. The model includes effects of additive particles used to suppress wall erosion in turbulent propellant combustion. At its current stage of development the model simulates additive erosion reduction by alteration of erosive boundary layer convection and transport processes. Turbulent particle/gas interactions are computed using random statistical velocity fluctuations. These produce particulate trajectories, distributions and momenta. The interactions include effects of particle size, mass, and rotation as well as two-particle hard sphere collisions. The main purpose of this work is to evaluate the effects of direct coupling between particle-laden boundary layer and an eroding solid surface. Even in the absence of thermal relaxation, the heat transfer rates are found to be substantially reduced when smaller diameter (0.2 mu m) particles are introduced as compared to larger diameter particles (5 mu m). The apparently substantial influence of water vapor in the combustion products is also examined. (ERA citation 05:014013)

UCRL-83075 PC **A02**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Unsteady Gun-Barrel Boundary-Layer Calculations.
S. W. Kang, and J. L. Levatin. 28 Jan 80, 10p CONF-800308-2
Contract W-7405-ENG-36
JANNAF propulsion meeting, Monterey, CA, USA, 11 Mar 1980.

The paper describes current progress in the calculation of nonsteady boundary layers involved in internal flow situations to determine the dominant mechanisms of erosion. A time-dependent description of the viscous (laminar and turbulent) layer is formulated, and numerical solutions are obtained by application of a factored ADI scheme. The conservation equations in the alternate-sweep form are then solved under prescribed (transient and streamwise varying) core-flow conditions. Verification of the method is made by comparing with available previous analyses, with favorable agreement. Calculations of the compressible, turbulent flow cases demonstrate strongly nonsimilar flow characteristics, suggesting that the high heat flux at the wall due to turbulence and the changing core conditions may in time cause severe temperature rise at the wall and may produce environments conducive to melting, ablation and erosion of the surface itself. (ERA citation 05:014014)

20. PHYSICS

20A. Acoustics

AD-A082 698/2 Not available NTIS
Defence and Civil Inst of Environmental Medicine Downsview (Ontario)
Single-Transducer Coupler for Diagnostic Pulsed Doppler or Pulse-Echo Ultrasonic Instrumentation,
K. E. Kisman, and B. C. Eatock. 1975, 8p Rept no. DCIEM-PUB-77X20
Availability: Pub. in IPC Science and Technology Press, Ltd., p227-234 (No copies furnished by DTIC).

No abstract available.

AD-A082 746/9 PC **A03**/MF **A01**
David W Taylor Naval Ship Research and Development Center Bethesda MD Ship Acoustics Dept
NAUSEA and the Principle of Supplementarity of Damping and Isolation in Noise Control.
Final rept.,
Gideon Maidanik. Feb 80, 34p Rept no. DTNSRDC/SAD-263E-1902

New approaches and uses of the statistical energy analysis (NAUSEA) have been considered and developed in recent months. The advances were made possible in that the requirement, in the olde statistical energy analysis, that the dynamic systems be highly reverberant and the couplings between the dynamic systems need be conservative could be relaxed in the new approaches. With this relaxation a large number of new uses have become available for analytical consideration in terms of the statistical energy analysis (SEA). A brief discussion and simple examples that relate to these recent advances will be presented. A delightful aspect of SEA, that is accentuated by NAUSEA, is that it establishes the principle of supplementarity of damping and isolation. Briefly, the principle states that in situations in which the application of either damping or isolation does not perform satisfactorily in controlling a noise problem, the supplemental application of dampling and isolation may perform effectively. The principle will be simple exemplified and discussed. (Author)

AD-A082 774/1 Not available NTIS
Saclant ASW Research Centre La Spezia (Italy)
An Estimation of the Scattering Function of an Undersea Acoustic Channel.
Memorandum rept.,
D. Costa, and E. Hug. 4 Apr 75, 8p Rept no. SACLANTCEN-SM-111
Availability: Pub. in Alta Frequenza, v45 n4 p241-87E -245-91E 1976 (No copies furnished by DTIC).

No abstract available.

AD-A082 775/8 Not available NTIS
Saclant ASW Research Centre La Spezia (Italy)
Calculation of Reverberation and Average Intensity of Broadband Acoustic Signals in the Ocean by Means of the RAIBAC Computer Model,
Wolfgang Bachmann, and Bernard de Raigniac. 25 Nov 74, 13p Rept no. SACLANTCEN-SR-11
Availability: Pub. in Jnl. of Acoustical Society of America, v59 n1 p31-39 Jan 76 (No copies furnished by DTIC).

No abstract available.

AD-A082 816/0 PC **A04**/MF **A01**
David W Taylor Naval Ship Research and Development Center Bethesda MD Ship Acoustics Dept
Transition from a Nonreverberant to a Reverberant Dynamic System.
Final rept.,
G. Maidanik. Jan 80, 65p Rept no. DTNRSDC/SAD-260E-1902

When a dynamic system is isolated from its environment it may become reverberant and inhibit the effectiveness of the isolation. This paper considers the transition from a nonreverberant to a reverberant situation introduced by isolation. An example is cited dealing with the power radiated from an enclosure to its environment. Consideration is focused on an attempt to reduce the power by isolating the enclosure from its environment. The isolation is achieved by covering the outside walls with decoupling coating. It is argued that such an isolation may not perform as expected. It is shown that to render the isolation effective, damping may be used. This is true even if, prior to isolation, the application of damping was futile in reducing the power radiated. Damping and isolation are thus found to be supplemental. A discussion of the 'Principle of Supplementarity' is presented.

AD-A082 905/1 Not available NTIS
McGill Univ Montreal (Quebec) Dept of Electrical Engineering
Thickness Effects in Overlay Guides for Elastic Surface Waves,
C. C. Tu, and Gerald W. Farnell. 30 Jun 72, 13p DRB-REPRINT-4041

Availability: Pub. in IEEE Transactions on Sonics and Ultrasonics, vSU-20 n4 p302-314 Oct 73 (No copies furnished by DTIC).

No abstract available.

N80-21101/4 PC **A03**/MF **A01**
National Aeronautics and Space Administration, Washington, DC.
A Model Theory for the Fibrous Absorber. Part 1: Regular Fibre Arrangements.
F. P. Mechel. Mar 80, 33p NASA-TM-75800
Contract NASW-3199
Transl. into English from Acustica, (Germany, F.R.), V. 36, No. 2, 1976 - 1977 p 53-64. Transl. By Kanner (Leo) Associates, Redwood City, Calif. Original DOC. Prep. By Univ. Of the Saarland Acoustics Lab., Saarbrucke.

The axial propagation of sound waves in a model consisting of parallel fibers is calculated. The viscous forces and the thermal conduction are taken into account. This leads to viscous waves and to thermal waves besides the usual acoustic compression wave. The potential function for the total field near a fiber is treated as the superposition of the radiated field from the fiber itself and of the scattered fields from all the other fibers. The explicit field equations for a regular square fiber arrangement is derived and the influence of the order of symmetry of the arrangement is discussed. This leads to simplifications in the field equations and to field equations for the case of a homogeneous fiber distribution.

PAT-APPL-6-094 269 PC **A02**/MF **A01**
Department of the Navy Washington DC
Array Shading for a Broadband Constant-Directivity Transducer.
Patent Application,
W. James Trott, and Jack Jarzynski. Filed 14 Nov 79, 17p AD-D007 088/6
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

This invention relates generally to acoustic transducers for underwater and ultrasonic applications and more particularly to a broadband directional transducer which provides a constant beamwidth that is independent of frequency over its bandwidth and which produces both an azimuthal pressure distribution that is independent of the distance from the transducer and a beam pattern that has no side lobes. A constant beamwidth transducer, that is, a transducer whose beam pattern is independent of frequency over a wide frequency range, is desirable for many applications in ultrasonics and underwater acoustics. Some examples of possible applications for such a transducer are: broadband echo ranging, high data rate communication, and nondestructive ultrasonic testing, medical diagnosis and materials research. Most directional acoustic transducers and arrays exhibit beam patterns which are frequency-dependent; for example, the beamwidth of a plane piston or line array decreases with increasing frequency. As a result, the spectral content of a transmitted or received signal varies with location in the beam.

PAT-APPL-6-095 112 PC **A02**/MF **A01**
Department of the Navy Washington DC
Ferrofluid Transducer.
Patent Application,
James W. Overby, III. Filed 16 Nov 79, 9p AD-D007 139/9
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

This document discloses a magnetic fluid transducer for producing a low-frequency sound field in a fluid medium. The device comprises a non-magnetic cylindrical housing with end windows. The housing is surrounded by a magnetic-field-generator means and contains a magnetic fluid within the housing. The magnetic field penetrates the housing and interacts with the magnetic fluid. A body force is developed within the fluid which produces an internal pressure in local regions defined by the lines of magnetic flux. This internal pressure is transmitted by an acoustic transmitting medium to the surrounding fluid as a sound pressure level. (Author)

PAT-APPL-6-101 362 PC **A02**/MF **A01**
Department of the Navy Washington DC
Piezoceramic Tubular Element with Zero End Displacement.
Patent Application,
W. James Trott. Filed 7 Dec 79, 9p AD-D007 140/7
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

This invention relates to hydrophones and more particularly to a hydrophone which has an omnidirectional sensitivity characteristic over the widest possible frequency range. Heretofore hydrophones have been made with piezoelectric materials in the form of rings, cylinders, plates, etc. These have been singularly poled either radially or in the axial or circumferential direction. If a tubular element is polarized through its thickness, i.e., radially poled, the sensitivity in the axial direction falls below the sensitivity in the radial direction when the diameter of the element is more than 5% of the wavelength of the sound. For elements poled in the axial or circumferential directions, the sensitivity in the radial direction falls below the sensitivity in the axial direction in the same range of diameter-to-wavelength. It has been determined that the directional sensitivity is largely due to sensitivity of the end caps and that a tubular element will remain omnidirectional up to a diameter-to-wavelength ratio of 0.5 if the end caps are insensitive or if the ends of the piezoceramic element are shielded from the sound field and the length of the tubular element is 1.5 times its diameter. This invention overcomes the problems of the prior art by combining in one piezoceramic tubular element a radially poled section with an axially or circumferentially poled section by which the end caps are made motionless if the element is driven electrically or insensitive to the sound field without shielding. (Author)

PAT-APPL-6-115 643 PC **A02**/MF **A01**
Department of the Navy Washington DC
Linear Acoustic Array.
Patent Application,
Richard C. Swenson. Filed 28 Jan 80, 13p AD-D007 083/9
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A linear acoustic array for use in oceanographic work in either a towed or a vertically suspended configuration utilizes a flexible cable in which strands are woven or braided into a tube, the strands of which can be separated sufficiently to insert a hydrophone and multiplexer assembly at each of a plurality of specified locations there along. Each hydrophone and multiplexer assembly is adapted to be readily connected into or removed from a two wire system. (Author)

PATENT-4 195 244 Not available NTIS
National Aeronautics and Space Administration. Langley Research Center, Langley Station, VA.
Cds Solid State Phase Insensitive Ultrasonic Transducer.
Patent,
J. S. Heyman. Filed 26 Jul 78, patented 25 Mar 80, 8p N80-20559/4, PAT-APPL-928 130, NASA-CASE-LAR-12304-1
Supersedes PAT-APPL-928 130-78, N78-29871 (16 - 20, p 2725).
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC. 20231 $0.50.

A phase insensitive ultrasonic transducer which includes a CdS crystal that is annealed for a selected period of time and at a selected temperature to provide substantially maximum acoustic attenuation at the operating frequency of the transducer is described. Two electrodes are attached to the crystal with amplifier means and a signal processing system connected to one of the electrodes to provide an ultrasonic receiver.

20B. Crystallography

AD-A082 475/5 PC **A02**/MF **A01**
Rockwell International Thousand Oaks CA Science Center
Temperature Gradient Measurement in Liquid Epitaxial Growth Systems,
B. W. Ludington, and A. A. Immorlica, Jr. 13 Oct 78, 5p AFOSR-TR-80-0154
Contract F44620-76-C-0134
Pub. in Jnl. of Crystal Growth, v47 p619-622 1979.

No abstract available.

DOE/TIC-11057 PC **A02**/MF **A01**
Oak Ridge National Lab., TN.
Computer-Generated Illustrations.
C. K. Johnson. 1979, 10p
Contract W-7405-ENG-26

The computer graphics technique is one of the best available methods for analyzing and communicating complex results involving crystallographic structural information. The article starts by pointing out some factors in the visual analysis of technical illustrations. The types of commercial equipment available for use in crystallographic computer graphics and the commitment needed from the user of typical operational configurations are discussed. The Oak Ridge Crystallographic Imaging and Graphics System is given as an example configuration for stepwise interactive graphics and image processing. The applications of computer graphics to crystallography described are density-map representation, particularly by critical-point networks, and the drawing of crystal structures. The various types of line drawings and surface illustrations currently in use are discussed, and two solutions of the hidden-line problem for thermal-ellipsoid drawings are compared. (ERA citation 05:011011)

PAT-APPL-6-086 504 PC **A02**/MF **A01**
Department of the Army Washington DC
Acceleration Resistant Crystal Combination.
Patent Application,
John R. Vig, and Arthur Ballato. Filed 19 Oct 79, 14p AD-D007 112/6
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

It is therefore an object of the present invention to provide an acceleration resistant crystal configuration which is acceleration resistant along all directions. It is another object of the present invention to provide an acceleration resistant crystal configuration which is rugged and is highly resistant to breakage. In brief, these and other objects of the invention are achieved by having two crystals which are electrically coupled or mechanically coupled, or both electrically and mechanically coupled together. At least two axes of one crystal are disposed in anti-parallel relationship with the corresponding axes of the other crystal.

20C. Electricity and Magnetism

AD-A082 917/6 PC **A02**/MF **A01**
Office of Naval Research London (England)
Electrostatics 1979.
Irving Kaufman. 28 Nov 79, 14p Rept no. ONRL-C-11-79

This report covers a 2 1/2 day conference on problems related to Electrostatics, held at St. Catherines College of Oxford University. Subjects discussed were Industrial Electrostatics; Electrostatics Hazards; Electrostatics and Fluids; Electrostatic Behavior of Solids, including contact charging phenomena; Measuring Techniques; and Atmospheric Electricity. Five invited and 31 contributed papers were presented. Subjects discussed range from modeling of processes leading to electrostatic discharges to practical means of minimizing charging of jet fuel. (Author)

20D. Fluid Mechanics

AD-A082 588/5 PC **A02**/MF **A01**
California Univ Berkeley Dept of Mechanical Engineering
Directed Fluid Sheets and Gravity Waves in Compressible and Incompressible Fluids,
A. E. Green, and P. M. Naghdi. 28 Feb 79, 17p
Contract N00014-76-C-0474
Pub. in International Jnl. of Engineering Science, v17 p1257-1272 1979.

No abstract available.

AD-A082 595/0 PC **A02**/MF **A01**
California Inst of Tech Pasadena Dept of Engineering Science
Hydromechanics of Low-Reynolds-Number Flow. Part 5. Motion of a Slender Torus,
Robert E. Johnson, and Theodore Y. Wu. 20 Feb 79, 20p Rept no. E-97B-55
Contract N00014-76-C-0157
See also Part 4, AD-A031 539. Pub. in Jnl. of Fluid Mechanics, v95 PT2 p263-277 1979.

No abstract available.

AD-A082 634/7 PC **A04**/MF **A01**
Tennessee Univ Space Inst Tullahoma
Flow Visualization Study of Secondary Flow in a Corner.
Final rept. 1 Jan 78-30 Jun 79,
Frank G. Collins. Dec 79, 53p AFOSR-TR-80-0257
Grant AFOSR-78-3537

An experimental investigation has been made of secondary flow in a 90 degree corner. The tests were run in a water tunnel at low speed (approximately 0.3 ft. per sec.) with emphasis on an attempt to visualize the embedded vortices in the laminar flow. The Reynolds number range was 11,000 to 52,500 per foot; the corner model was 9.75 in. wide by 48 in. long. The model was aligned in the tunnel so that no streamwise pressure gradient was present. Flow visualization was by means of hydrogen bubbles and dye. None of the streakline examined with either the bubbles or the dye showed any indication of the presence of secondary motion in the first 18 inches of the corner. This is not believed to be conclusive since the vortices may exist at other distances along the corner (the limit here was imposed by the flow visualization apparatus used) or may be poorly developed in the initial length examined. (Author)

AD-A082 851/7 PC **A08**/MF **A01**
Pennsylvania State Univ University Park Applied Research Lab
A Theory for Cavitation Inception in a Flow Having Laminar Separation.
Technical memo.,
B. R. Parkin. 19 Nov 79, 175p Rept no. ARL/PSU/TM-79-198
Contract N00024-79-C-6043

An approximate theory is developed to predict onset of cavitation on hemispherical head forms for Reynolds numbers at which laminar separation is known to occur. Fairly good agreement is obtained between cavitation inception (or desinence) trends recently measured and the present theory which is based upon first principles as far as possible. Moreover, the observed occurrence of a lowest speed for 'bubble-ring' cavitation, which is the only cavitation form considered, and the range of 'cutoff' speeds predicted by the present asymptotic theory show very encouraging agreement. Like the experiments, this theory suggests that the cutoff speed and its accompanying cutoff cavitation number can also depend on water temperature, provided that the initial size attributed to a 'typical' spherical free-stream air bubble nucleus also varies with temperature. At 80 F (26.6 C) it is found that the typical nucleus from which bubble-ring cavitation orginates has a radius of about seven microns. At higher temperatures the nucleus radius decreases from this value while at lower temperatures the initial radius exceeds the value noted. It is also found that: the onset cavitation number should be less than the magnitude of the pressure coefficient at the laminar separation point; and that the cavitation number increases with free-stream velocity. As long as there is an appreciable concentration of dissolved air in the water, it is also found that in agreement with experiment, the onset of bubble-ring cavitation is practically independent of air content.

LA-8163-MS PC **A07**/MF **A01**
Los Alamos Scientific Lab., NM.
Simulation of Tank Draining Phenomena with the NASA SOLA-VOF Code.
R. S. Hotchkiss. Dec 79, 133p
Contract W-7405-ENG-36

The NASA SOLA-VOF code is a modified version of the SOLA-VOF computer program, specifically designed to calculate the fluid dynamics involved in baffled and unbaffled tank draining problems. It solves the time dependent finite-difference equations that govern the two-dimensional motions of fluids with a free surface upon which surface tension forces can act. The VOF method of tracking the free surface provides an algorithm by which multivalued free surface calculations with surface tension are easily performed. Calculations can be made in either planar or cylindrical geometries with a variety of boundary conditions. The surface tension boundary condition is modeled by an applied surface pressure and wall adhesion effects are specified by a wall contact angle. Complete descriptions are given of the code structure, of procedures for running and setting up the code, of the variables used and of test problems that show the excellent agreement between the calculations and experiments of tank draining problems. A complete computer listing is included in an appendix. (ERA citation 05:012309)

N80-20527/1 PC **A04**/MF **A01**
National Aeronautics and Space Administration. Ames Research Center, Moffett Field, CA.
Progress in Turbulence Modeling for Complex Flow Fields Including Effects of Compressibility.
D. C. Wilcox, and M. W. Rubesin. Apr 80, 73p
NASA-TP-1517, A-7916

Two second-order-closure turbulence models were devised that are suitable for predicting properties of complex turbulent flow fields in both incompressible and compressible fluids. One model is of the 'two-equation' variety in which closure is accomplished by introducing an eddy viscosity which depends on both a turbulent mixing energy and a dissipation rate per unit energy, that is, a specific dissipation rate. The other model is a "Reynolds stress equation" (RSE) formulation in which all components of the Reynolds stress tensor and turbulent heat-flux vector are computed directly and are scaled by the specific dissipation rate. Computations based on these models are compared with measurements for the following flow fields: (a) low speed, high Reynolds number channel flows with plane strain or uniform shear; (b) equilibrium turbulent boundary layers with and without pressure gradients or effects of compressibility; and (c) flow over a convex surface with and without a pressure gradient.

N80-20529/7 PC **A03**/MF **A01**
National Aeronautics and Space Administration. Langley Research Center, Hampton, VA. Aerothermodynamics Branch.
Complete Supersonic Flowfields over Blunt Bodies in a Generalized Orthogonal Coordinate System.
Final Report.
P. A. Gnoffo. 17 Sep 79, 45p NASA-TM-81784, LOG-J11338
Backup Document for Aiaa Synoptic Scheduled for Publication in Aiaa Journal, May 1980.

A general orthogonal coordinate system is used to describe various axisymmetric and two-dimensional shapes. Close approximations to planetary probe configurations are possible. The full Navier-Stokes equations are discretized in this coordinate system in a manner based on Allen and Cheng's numerical procedure. The blow shock is treated as a discontinuity which floats between grid points. Completely coupled flows over the forebody, base, and near wake were calculated over a cylinder, sphere, and an approximation to the Viking Aeroshell. Some problem areas in determining the base flow for increasing Reynolds number are discussed. In particular, it is found that the mean free path of the fluid near the wall immediately below the corner of the Viking Aeroshell, which experiences a severe expansion, can becume greater than the local mesh size required to resolve the boundary layer in the forebody.

N80-20554/5 PC **A05**/MF **A01**
Max-Planck-Inst. fuer Stroemungsforschung, Goettingen (Germany, F.R.).
Theoretical Study of Steady Vortex Rings in the Case of Variable Partitioning of the Force Theoretische Untersuchung Stationaerer Ringwirbelstroemungen MIT Unstetiger Wirbelstaerkenverteilung.
W. Poppe. Dec 78, 99p MPIS-29/1978

Text in German.

Norbury's method of calculating the nucleus of annular vortexes and their translation velocity was verified. The case of a small nucleus (with respect to diameter of the ring) as well as a nonsymmetric nucleus were studied. The methods of calculation and the numerical methods used to study the variable partitioning of turbulent energy are described.

PAT-APPL-895 340 PC **A02**/MF **A01**
National Technical Information Service, Springfield, VA.
Method and Apparatus for Measuring Gas Flow Speed.
Patent Application,
T. T. Fujita, and A. J. Bedard, Jr. Filed 11 Apr 78, 14p PB80-176886
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A method and apparatus for measuring the speed of a gas stream, particularly suitable for use in detecting wind speed, uses the gas flow to create a negative pressure across a pressure sampling port oriented with its axis substantially perpendicular to the gas flow, the negative pressure being created by accelerating the gas flow stream lines over a surface of revolution containing the port. The negative pressure is compared with a reference pressure by means of a pressure transducer whereby the transducer output is representative of the speed of the gas. In a preferred form, the apparatus comprises a first pressure probe in the form of a sphere mounted on a tube projecting axially from a hollow cylindrical cup-like member with the sampling port formed in the base of the sphere and the cup-like member forming a second pressure probe with a pressure tapping internally of the cup providing the source of reference pressure.

PB80-810146 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Cavity Flow. 1971-March, 1980 (Citations from the NTIS Data Base).
Rept. for 1971-Mar 80,
Guy E. Habercom, Jr. May 80, 267p
Supersedes NTIS/PS-79/0259 and NTIS/PS-78/0188. See also 1964-1970, NTIS/PS-76/0400.

Reports are cited on shallow and deep configurations, holes, cutouts, hollows, notches, gaps, orifices, flaps, and steps. Applications include bomb bays, aerodynamic windows, microwave cavities, resonators, diffusers, laser cavities, and jets. (This updated bibliography contains 260 abstracts, 29 of which are new entries to the previous edition.)

UCRL-83609 PC **A02**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Brightness Temperature Measurements for High-Energy Jet Propagation.
H. D. Glenn. 16 Jan 80, 13p CONF-800307-2
Contract W-7405-ENG-48
Fiber optic in the nuclear environment symposium, Adelphi, MD, USA, 25 Mar 1980.

This paper describes the use of fiber optics to measure times of arrival and brightness temperature profiles for high-energy gas jets. Voitenko compressors have been used to produce high-energy air and oxygen jets through steel pipes 2 cm in i.d. and 350 cm in length containing air initially at 0.02 Torr or less. Reduction of the time-of-arrival data indicated that velocities for the various identified jet components ranged between 2.40 and 7.95 cm/ mu sec. The fiber optics emplacement design and brightness temperature calibration procedure are described. Maximum brightness temperatures of 93,000 and 136,000 exp 0 K have been measured for air and oxygen jets, respectively, as they started down the exit pipes. Brightness temperature profiles have been obtained to 50 mu sec behind the jet front. The results suggest that delayed entrainment of wall material was the predominant factor in reducing pressures and temperatures in the slower components of the jet. (ERA citation 05:014460)

20E. Masers and Lasers

AD-A082 613/1 PC **A03**/MF **A01**
Memphis State Univ TN Inst for Engineering Research
Investigation of the Pulse-to-Pulse Phase Coherence of Carbon Dioxide Lasers.
Final rept. 15 Jan 79-14 Jan 80,
Carl E. Halford. Jan 80, 27p ARO-16279.2-R-P
Contract DAAG29-79-C-0018

The phase coherence properties of pulsed carbon dioxide lasers are analyzed. Experimental results for a self-pulsing helium neon ring laser are presented and used to calculate the average phase coherence time for that system. Experimental factors are the primary limitations for phase coherence. These factors influence the phase by altering the resonant cavity by mirror motion or by index of refraction changes. The importance of these two factors are assessed for high power TEA lasers using the experimental results of others. A novel technique of active phase correction for correcting the phase of pulsed lasers is presented. (Author)

AD-A082 665/1 PC **A07**/MF **A01**
Army Missile Command Redstone Arsenal AL High Energy Laser and Research Lab
Cumulative Reactant Species Index for Volumes I-V of the Compilation of Data Relevant to Gas Lasers. Volume VI.
Technical rept.,
E. W. McDaniel, M. R. Flannery, S. T. Manson, J. W. Gallagher, and T. G. Roberts. Sep 79, 143p
Rept no. DRSMI-H-78-1-VOL-6
See also Volume 5, AD-A073 575.

This volume contains a cumulative reactant species index for MIRADCOM Technical Report H-78-1. Volumes I and II covered data relevant to rare gas - rare gas and rare gas - monohalide excimer lasers. Volumes III-V covered data relevant to nuclear pumped lasers. (Author)

AD-A082 783/2 Not available NTIS
Defence Research Establishment Valcartier (Quebec)
One Nanosecond CO2 Laser Chain for Laser-Target Interaction Studies,
F. Rheault, J. -L. Lachambre, P. Lavigne, H. Pepin, and H. A. Baldis. 3 Mar 75, 6p DRB-REPRINT-4135
Availability: Pub. in Review of Scientific Instruments, v46 n9 p1244-1248 Sep 75 (No copies furnished by DTIC).

No abstract available.

AD-A082 864/0 Not available NTIS
Defence Research Establishment Valcartier (Quebec)
Frequency and Amplitude Characteristics of a High Repetition Rate Hybrid TEA-CO2 Laser,
Jean-Louis Lachambre, P. Lavigne, Michel Verreault, and Gabriel Otis. 11 Aug 77, 9p DRB-REPRINT-4202
Availability: Pub. in IEEE Jnl. of Quantum Electronics, VQE-14 n3 p170-177 Mar 78 (No copies furnished by DTIC).

No abstract available.

AD-A082 865/7 Not available NTIS
Defence Research Establishment Valcartier (Quebec)
A Sealed High-Repetition-Rate TEA CO2 Laser,
Paul W. Pace, and Marc Lacombe. 29 Aug 77, 13p DRB-REPRINT-4204
Availability: Pub. in IEEE Jnl. of Quantum Electronics, vQE-14 n4 p263-274 Apr 78 (No copies furnished by DTIC).

No abstract available.

AD-A082 867/3 Not available NTIS
Defence Research Establishment Valcartier (Quebec)
Simultaneous Frequency Stabilization and Injection in a TEA-CO2 Oscillator,
J. -L. Lachambre, G. Otis, and P. Lavigne. 1978, 4p DRB-REPRINT-4203
Availability: Pub. in Applied Optics, v17 n7 p1015-1017, 1 Apr 78 (No copies furnished by DTIC).

No abstract available.

AD-A082 937/4 PC **A02**/MF **A01**
Smithsonian Astrophysical Observatory Cambridge MA
A Study of Cryogenic Techniques for Operating Hydrogen Masers.
Interim rept. 1 Jul 79-31 Jan 80,
Robert F. C. Vessot. Feb 80, 5p
Contract N00014-77-C-0777

Cryogenic Techniques are applied to the Atomic Hydrogen Maser Frequency Standard to extend the storage time of the atoms and reduce the thermal noise accompanying the signal and within the resonance linewidth. Oscillation has been achieved below 25K using wall coatings of frozen CF 4. A pair of new masers is under construction so that frequency stability improvement can be measured. Stability at the 10 to the -16th power level in Delta f/f for averaging time intervals of 1,000 seconds is expected at temperatures below 30K. (Author)

AD-A082 982/0 PC **A03**/MF **A01**
Harry Diamond Labs Adelphi MD
Assessment of Pr3+:KY3F10 as a Blue-Green Laser.
Technical rept.,
Clyde A. Morrison, Donald F. Wortman, Richard P. Leavitt, and Hans P. Jenssen. Feb 80, 28p
Rept no. HDL-TR-1897
Contract MIPR-78-MP-80020A020

The reported energy levels of praseodymium and europium in the host material KY3F10 have been analyzed. Using the x-ray data, lattice sums have been done, and odd crystal-field parameters have been calculated. Using these results, the transition probabilities for both magnetic and electric dipoles have been calculated for the rare earth ions. Discussions are given of the application of the results to a blue-green laser using praseodymium. (Author)

COO-2523-15 PC **A02**/MF **A01**
Johns Hopkins Univ., Baltimore, MD.
Far Infrared Chemical Lasers. Technical Progress Report No. 5, September 1, 1978-August 31, 1979.
D. W. Robinson. 1979, 5p
Contract EY-76-S-02-2523

The intention to use the optically-pumped water vapor laser to study energy absorption and transfer in this triatomic molecule was not realized. The system at this moment is not well-enough understood to be as useful as was originally anticipated. What is known is that laser action in the far infrared is the result of flash-pumping, through suprasil, water vapor in the 10-100 mtorr pressure range, in a large resonator. About ten lines at about 100-200 cm exp -1 have been found. Four of them very definitely can be assigned to transitions that evolve from the feeding of the level (001)6 sub 42 . The other lines are of dubious assignment or completely unassignable. All of the hundred or so lines of well-known water discharge laser have been assigned to places in the level scheme where the bend-stretch wave functions are mixed. (ERA citation 05:012298)

N80-20575/0 PC **A05**/MF **A01**
Ohio State Univ. Research Foundation, Columbus.
Error Analysis for a Spaceborne Laser Ranging System.
E. C. Pavlis. Dec 79, 89p NASA-CR-162687, REPT-290
Grant NSG-5265, Contract OSURF PROJ. 711055

The dependence (or independence) of baseline accuracies, obtained from a typical mission of a spaceborne ranging system, on several factors is investigated. The emphasis is placed on a priori station information, but factors such as the elevation cut-off angle, the geometry of the network, the mean orbital height, and to a limited extent geopotential modeling are also examined. The results are obtained through simulations, but some theoretical justification is also given. Guidelines for freeing the results from these dependencies are suggested for most of the factors.

PAT-APPL-6-087 116 PC **A02**/MF **A01**
Department of the Army Washington DC
New Supports and Preparation Process for the Manufacture of a Calcium Chemical Pump for HF/DF Laser.
Patent Application,
Pasquale Martignoni, James A. Murfree, Henry A. Nappier, Orval E. Ayers, and William M. Chew. Filed 22 Oct 79, 7p AD-D007 110/0
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A process is described for producing a calcium chemical pump which includes reacting calcium and anhydrous ammonia in a closed vessel that is cooled to a temperature below 0 C to form a solution of the calcium and anhydrous ammonia and then spraying the solution onto a rotating porous foamed substrate material in a closed container that has a vacuum pulled thereon, and the solution when sprayed causing the ammonia to flash and be evaporated and drawn off by the vacuum to cause the calcium to be deposited on the rotating porous foamed substrate material.

PAT-APPL-6-130 496 PC **A02**/MF **A01**
National Aeronautics and Space Administration. Pasadena Office, CA.
Method and Apparatus for Convection Control of Metallic Halide Vapor Density in a Metallic Halide Laser.
Patent Application,
T. J. Pivirotto. Filed 14 Mar 80, 14p N80-20574/3, NASA-CASE-NPO-15021-1
Contract NAS7-100
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A method and apparatus for convection control of metallic halide vapor density in a metallic halide laser are described. A reservoir containing copper chloride is heated so that the copper chloride is maintained in a liquid form. The apparatus includes a means for flowing a buffer gas (neon) over the liquid copper chloride to provide a mixture of copper chloride vapor and neon above the liquid copper chloride. A conduit for providing fluid communication between the reservoir containing the copper chloride vapor/neon mixture and the laser is also included. The copper chloride vapor density in the laser is related to the liquid copper chloride temperature and the neon flow rate through the reservoir. Neon is also provided directly to the laser in order to provide a further means of controlling the copper chloride vapor density in the laser.

PAT-APPL-6-131 349 PC **A02**/MF **A01**
Department of the Navy Washington DC
Resonantly Pumped Mid-IR Laser.
Patent Application,
Leon Esterowitz, and Melvin R. Kruer. Filed 19 Mar 80, 6p AD-D007 072/2
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A solid-state laser operative in the mid infrared region (3-5 micrometers) comprises a YLF laser including a trivalent terbium activator which is pumped by a resonant external laser source (Ho:YLF, 2.06 micrometers laser) to directly populate the upper laser level which achieves inversion before non-radiative decay depletes the initial laser-level population. The initial laser manifold that is externally pumped is the 7F2 manifold. Inversion is then between the 7F3 and 7F5 manifolds and laser oscillation at 4.1 micrometers is obtained. (Author)

20F. Optics

AD-A082 450/8 PC **A04**/MF **A01**
Hughes Research Labs Malibu CA
Infrared Fiber Optics.
Interim rept. 14 Apr 78-14 Apr 79,
James A. Harrington, R. Turk, M. Henderson, and Jon Myer. Dec 79, 51p RADC-TR-79-290
Contract F19628-78-C-0109

This interim technical report summarizes the first year's research efforts to fabricate optical communications fibers that are transmissive between 1 and 12 micrometers. The ultimate objective of this program is to prepare infrared transmitting fibers

with losses less than 5 dB/km. In preparing infrared transparent fibers with these losses, we are emphasizing the extrusion into fiber of very pure KCl as this material has demonstrated bulk losses equal to or less than 5 dB/km in the 2- to 6-micrometers region. The primary approach used to meet the program goals, therefore, was the extrusion of reactive atmosphere process (RAP) grown KCl into 250- to 1000-micrometers-diameter optical fibers. After one year of effort, the best KCl fiber extruded had a loss of 4200 dB/km. This report also summarizes our efforts in fabricating a special infrared fiber prototype device for the detection of pulsed CO_2 laser radiation. The prototype device, which is to be used in a battlefield identification friend or foe (BIFF) application, was successfully field tested in Germany.

AD-A082 505/9 PC **A03**/MF **A01**
Hughes Research Labs Malibu CA
Microwave Fiber-Optics Delay Line.
Final rept. 25 Jun-24 Dec 79,
C. Slayman, and H. W. Yen. Jan 80, 31p
Contract N00173-79-C-0098

A microwave delay line is one of the devices used in EW systems for preserving the frequency and phase contents of rf signals. For such applications, delay lines are required to have large dynamic range, wide bandwidth, low insertion loss, and a linear response. The basic components of a fiber-optics delay line are: an optical source, a wideband optical modulator, a spool of single-mode fiber with appropriate length to provide a given microwave signal delay, and a high-speed photodetector with an rf amplifier. This contract program is to study the feasibility of such a fiber-optic delay line in the frequency range of 4.0 to 6.5 GHz. The modulation scheme studied is the direct modulation of injection lasers. The most important issue identified is the frequency response of the injection laser and the photodetector.

AD-A082 657/8 PC **A02**/MF **A01**
Northwestern Univ Evanston IL Dept of Electrical Engineering
Optical Beam Propagation for a Partially Coherent Source in the Turbulent Atmosphere,
S. C. H. Wang, and M. A. Plonus. 16 Mar 79, 9p
AFGL-TR-80-0075
Contract F19628-79-C-0068
Pub. in Jnl. of the Optical Society of America, v69 n9 p1297-1304 Sep 79.

No abstract available.

AD-A082 658/6 PC **A02**/MF **A01**
Northwestern Univ Evanston IL Dept of Electrical Engineering
Irradiance Scintillations of a Partially Coherent Source in Extremely Strong Turbulence,
S. C. H. Wang, M. A. Plonus, and C. F. Ouyang. 30 Dec 78, 4p AFGL-TR-80-0081
Contract F19628-79-C-0068
Pub. in Applied Optics, v18 n8 p1133-1135, 15 Apr 79.

No abstract available.

AD-A082 788/1 Not available NTIS
Defence Research Establishment Valcartier (Quebec)
Laser Beam Propagation in Particulate Media,
W. G. Tam, and A. Zardecki. 6 Mar 78, 4p DRB-REPRINT-4229
Availability: Pub. in Jnl. of the Optical Society of America, v69 n1 p68-70 Jan 79 (No copies furnished by DTIC).

No abstract available.

AD-A082 794/9 Not available NTIS
Defence Research Establishment Valcartier (Quebec)
Focusing of Laser Beams by a Sequence of Irises,
G. Otis, J. -L. Lachambre, and P. Lavigne. 6 Sep 78, 10p DRB-REPRINT-4228
Availability: Pub. in Applied Optics, v18 n6 p875-883, 15 Mar 79 (No copies furnished by DTIC).

No abstract available.

AD-A082 830/1 PC **A03**/MF **A01**
Optical Sciences Co Placentia CA
Analysis of Advanced CI Applications and Systems Performance.
Interim rept. Mar-Oct 79,
David L. Fried, and Stephen L. Browne. Mar 80, 31p DR-150, RADC-TR-79-328
Contract F30602-79-C-0062, ARPA Order-2646

This report examines two problems. The first is that of scaling previously developed probabilities of a good short exposure to other resolution conditions. The second is of combining low resolution adaptive optics with speckle techniques. Results previously developed for the probability that at some instant the random wavefront distortion over a circular aperture will be less than one radian squared (averaged over the aperture at that instant) are extended to apply to other values than one radian squared. These probabilistic results are then combined with estimates of the relationship between short exposure resolution and residual wavefront error to provide results for the probability of achieving some desired resolution as a function of aperture diameter. It is found that the optimum aperture diameter to achieve a desired level of resolution is almost exactly twice the diameter for which the diffraction limited resolution is equal to the desired resolution, and that the probability of obtaining the desired resolution with that aperture diameter is equal to the probability, previously evaluated, of having one radian squared residual wavefront error on a single short exposure with that aperture diameter. The second part develops an expression for the power spectrum of the focal plane intensity in an adaptive optics two aperture (i.e.,) Michelson stellar interferometer) system acting on a turbulence-distorted single-point-source wavefront. The adaptive optics elements for this system are assumed to correspond to each single aperture of this two aperture system. It is found that no improvemnt in performance is achieved in speckle interferometry with adaptive optics over conventional optics, in as much as the power spectrum is virtually unchanged.

AD-A083 005/9 PC **A06**/MF **A01**
Raytheon Co Waltham MA Research Div
Manufacturing Methods & Technology Program, Zinc Selenide Blanks for Windows and Lens Elements.
Final technical rept. 17 Jul 78-17 Nov 79,
R. N. Donadio, J. F. Connolly, and J. Pappis. Feb 80, 104p Rept no. S-2689
Contract DAAB07-78-C-2038

This program established a fully automated process for the chemical vapor deposition of zinc selenide blanks. Prior to the program Raytheon Company had an established production process for the fabrication of this material. Further, Raytheon Company had, on an experimental basis, determined that the process could be fully automated by replacing the internally housed zinc source system with an externally housed system that fed zinc into the furnace at a predetermined rate. This system was successfully used in the Pre-Engineering, Engineering, Confirmatory, and Pilot deposits to yield zinc selenide with good optical and mechanical properties. The program also demonstrated that this process significantly reduced the costs of standard type lens blanks. (Author)

AD-A083 039/8 MF **A01**
State Univ of New York At Albany
The Effect of Atmospheric Particulate Matter on the Propagation of a Laser Beam.
Final rept. 1 Jan-31 Dec 79,
Petr Chylek. Apr 80, 50p ARO-16508.2-GS
Grant DAAG29-79-G-0031
Availability: Microfiche copies only.

Contents: Light scattering by a pair of conjugate nonspherical particles. Verification of a linear relation between IR extinction, absorption and liquid water content of fogs; Perturbation approach to light scattering by non-spherical particles; and Surface waves in light scattering by nonspherical particles.

N80-21142/8 PC **A04**/MF **A01**
Battelle Columbus Labs., OH.
Ultrapure Glass Optical Waveguide Development in Microgravity by the Sol-Gel Process.
Final Progress Report, Mar. - Sep. 1979.
S. P. Mukherjee. 22 Feb 80, 58p NASA-CR-162910, JPL-9550-307
Contract JPL-955361
Prepared for JPL.

The alkali-borosilicate system was selected as the glass system for the preparation of ultrapure low loss glasses suitable for optical communication. The effect of different oxide contents on the absorption loss was critically reviewed. One composition was chosen to develop the gel preparation procedure in the alkali-borosilicate system. In addition, several procedures for the preparation of gels based on two different approaches were developed. The influence of different preparation parameters were investigated qualitatively. Several conclusions are drawn from the results.

N80-21143/6 PC **A04**/MF **A01**
Virginia Univ., Charlottesville. School of Engineering and Applied Science.
Investigation of Direct Integrated Optics Modulators.
Annual Status Report, 1 Nov. 1978 - 30 Nov. 1979.
T. E. Batchman. Mar 80, 69p NASA-CR-162894, UVA/528171/EE80/102
Grant NSG-1567

Direct modulation techniques applicable to integrated optics data preprocessors were investigated. Several methods of modulating a coherent optical beam by interaction with an incoherent beam were studied. It was decided to investigate photon induced conductivity changes in thin semiconductor cladding layers on optical waveguides. Preliminary calculations indicate significant changes can be produced in the phase shift in a propagating wave when the conductivity is changed by ten percent or more. Experimental devices to verify these predicted phase changes and experiments designed to prove the concept are described.

PAT-APPL-6-087 117 PC **A02**/MF **A01**
Department of the Army Washington DC
Improved High Energy Laser Beam Sampling Meter.
Patent Application,
John J. Wachs, and Andrew H. Jenkins. Filed 22 Oct 79, 7p AD-D007 109/2
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

This document discloses apparatus for accurately sampling and measuring beam power of a high energy laser beam without blocking or unduly perturbing the beam for phenomenological effects purposes and including a unitary sampling wheel which reflects a portion of the laser beam energy to a primary collecting and focusing mirror which re-reflects the laser beam onto a low level energy detector and a low level power detector for providing accurate and reliable samples through a wide range of frequencies and low amplitude without affecting beam characteristics and further use. (Author)

PAT-APPL-6-095 868 PC **A02**/MF **A01**
Department of the Navy Washington DC
Optical Amplification for the Fiber Interferometer Gyro.
Patent Application,
Donald J. Albares. Filed 19 Nov 79, 9p AD-D007 087/0
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

An improvement for a fiber interferometer gyro provides for greater rotation rate sensitivity. The gyro has a single mode fiber coiled about an identical area a great number of times. A single external laser sends pulses of energy which are split and passed in opposite directions through the coiled fiber and a pair of optical amplifiers inserted to amplify the energy pulses. This permits the length of the coiled fiber to be increased and, hence, provides for greater interferometer sensitivity. (Author)

PAT-APPL-6-099 262 PC **A02**/MF **A01**
Department of the Army Washington DC
Doppler Extended Depth of Field Imaging System with Coherent Object Illumination.
Patent Application,

James L. Smith, and Charles R. Christensen.
Filed 3 Dec 79, 14p AD-D007 104/3
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A packageable system employs priciples of Doppler holography on near-field objects to produce images from which photographs, transparencies or video reproductions can be made with simultaneous improvements in depth of field, foreground-backregion exposure ratio, and resolution (where degraded by the object medium). The apparatus consists of two units: a main unit containing a laser and optics, and an external platform that rotates at an appropriate angular velocity, through a very small arc, during image recording of an object on the platform. (Author)

PAT-APPL-6-116 173 PC **A02**/MF **A01**
Department of the Navy Washington DC
Integrated Bias for Waveguide Amplitude Modulator.
Patent Application,
William K. Burns. Filed 28 Jan 80, 12p AD-D007 142/3
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

It is the general purpose and object of the present invention to provide an integral, interferometric, optical-waveguide, amplitude modulator having a linear response to small applied voltages. Still another object is to provide a reliable modulator which can be easily and inexpensively manufactured. These and other objects of the present invention are accomplished by increasing the physical length of a first waveguide arm relative to that of a second waveguide arm, the increase, delta, being defined by delta = pi/(2Kn), where K = 2 pi/lambda and K is the free-space wavevector, lambda is the free-space wavelength of the optical energy, and n is the index of refraction of the waveguide material. The increase, delta, provides an integral bias of pi/2 radians to the modulator for producing a linear modulation of signal amplitude in response to small applied voltages. The novel feature of the present invention is the difference in length of pi/(2Kn) between two parallel waveguide arms, that is, an unbalanced bridge for providing a built-in phase bias of pi/2 radians between two optical paths.

PAT-APPL-6-121 625 PC **A02**/MF **A01**
Department of the Navy Washington DC
Dark Field Surface Inspection Illumination Technique.
Patent Application,
Paul A. Temple. Filed 14 Feb 80, 18p AD-D007 082/1
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A well collimated beam of light such as lineraly polarized light from a laser is transmitted into a prism. When the light reaches the exit side of the prism, it encounters a layer of index matching fluid which it transmits through and an optical sample which it continues to transmit through. The optical sample, index matching fluid and prism are all of similar index of refraction to permit continued transmittance of the light. The purpose of the arrangement is to permit light to be present within the optical sample at or greater than the critical angle whenever it reaches the surface. Upon reaching the surface of the optical sample the light undergoes total internal reflection off of the surface because it is at the critical angle and is transmitted back through the sample, index matching fluid and prism. The light exits from the prism.

PAT-APPL-6-123 339 PC **A02**/MF **A01**
Department of the Navy Washington DC
Phase-Conjugate Interferometer.
Patent Application,
Louis Sica, Jr., and Hwaling Harold Szu. Filed 21 Feb 80, 16p AD-D007 080/5
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

This document describes a speckle interferometer including a beam splitter, a mirror in the object beam arm, a phase-conjugate mirror in the reference beam arm, a converging lens and a photographic film. Laser light scattered retro-reflectively from a rough surface under investigation and passed through an imaging lens illuminates the interferometer. Fringes occur upon sandwiching a pair of exposures of the interference pattern made before and after deformation of the rough surface. The relative magnitude of the displacements from the original position at different points of the surface can be determined from the position of the fringes. (Author)

PAT-APPL-6-128 344 PC **A02**/MF **A01**
Department of the Air Force Washington DC
Method and Apparatus for Detecting Small Angular Beam Deviations.
Patent Application,
Filed 7 Mar 80, 24p AD-D007 129/0
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

This document discloses a method and apparatus for detecting small angular deviations of an input beam which utilizes a pair of diffraction gratings in series, both of which are operating in the Wood's anomaly region. As a result, the output intensity of the doubly diffracted input beam is at a maximum. Any deviation from the Wood's anomaly region by the input beam will substantially reduce the intensity of the output. This intensity variance is detected and utilized as an indication of a small angular deviation of the input beam. (Author)

PAT-APPL-6-134 597 PC **A02**/MF **A01**
Department of the Air Force Washington DC
Beam Alignment System.
Patent Application,
Donald A. Durran. Filed 27 Mar 80, 14p AD-D007 122/5
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

This document discloses a beam alignment system having a source for producing a first beam of electromagnetic radiation considered an alignment or reference beam, a source for producing a second beam of electromagnetic radiation to be aligned with the first beam and pair of rotating mirrors capable of being optically interposed at different times across the optical path of the first and second beams. The axes of rotation of the pair of mirrors are transverse to each other in order to enable each mirror to provide alignment information about the beams with respect to two different planes. The alignment information is indicative of a time difference between the reception by a first detector of the reflected first beam and the reflected second beam from the first mirror and a time difference between the reception by a second detector of the reflected first beam and the reflected second beam from the second mirror. These time differences are utilized to provide signals which are used to adjust the position of the source for the second beam in order to bring the second beam into alignment with the first beam in two different planes. (Author)

PAT-APPL-957 452 PC **A02**/MF **A01**
National Aeronautics and Space Administration. Pasadena Office, CA.
Method and Apparatus for Doppler Frequency Modulation of Radiation.
Patent Application,
J. S. Margolis, D. J. McCleese, M. S. Shumate, and C. H. Seamen. Filed 3 Nov 78, 13p N80-21141/0, NASA-CASE-NPO-14524-1
Sponsored by NASA.
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A method and apparatus is disclosed for frequency modulating radiation, such as from a laser, for optoacoustic detectors, interferometers, heterodyne spectrometers, and similar devices using two oppositely reciprocating cat's-eye retro-reflectors to Doppler modulate the radiation. By reciprocally moving both retroreflectors, the center of mass is maintained constant to permit smooth operation at many Hertz. By slightly offsetting the axis of one retroreflector relative to the other, multiple passes a light beam may be achieved for greater Doppler shifts with the same reciprocating motion of the retroreflectors. A Doppler shift of 2(v/c) V sub 0 occurs for each pass.

PATENT-4 189 234 Not available NTIS
National Aeronautics and Space Administration. Langley Research Center, Langley Station, VA.
Noncontacting Method for Measuring Angular Deflection.
Patent,
E. L. Bryant. Filed 23 Oct 78, patented 19 Feb 80, 4p N80-21138/6, PAT-APPL-953 390, NASA-CASE-LAR-12178-1
Supersedes PAT-APPL-953 390-78, N79-11866 (17 - 02, p 0252).
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC. 20231 $0.50.

An apparatus is described for indicating the instantaneous angular deflection of an object about a selected axis without mechanical contact with the object. Light from a light source is transmitted through a flat refractor to a converging lens which focuses the light through another flat refractor onto a differential photocell. The first flat refractor is attached to the object such that when the object is deflected about the selected axis the refractor is also deflected about that axis. The two flat refractors are identical and they are placed an equal distance from the converging lens as are the light source and the photocell. The output of the photocell which is a function of image displacement is fed to a high gain amplifier that drives a galvanometer which rotates the second flat refractor. The second refractor is rotated so that the image displacement is very nearly zero making the galvanometer current a measure of the deflection of the object about the selected axis.

PATENT-4 192 994 Not available NTIS
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.
Diffractoid Grating Configuration for X-Ray and Ultraviolet Focusing.
Patent,
S. O. Kastner. Filed 18 Sep 78, patented 11 Mar 80, 7p N80-21140/2, PAT-APPL-943 089, NASA-CASE-GSC-12357-1
Supersedes PAT-APPL-943 089-78, N78-32857 (16 - 23, p 3142).
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC. 20231 $0.50.

An aspheric grating is described which is operable to image local or distant point sources sharply in a designated wavelength, i.e., produce a perfectly stigmatic image in the given wavelength at grazing angles of incidence. The grating surface comprises a surface of revolution defined by a curve which does not have a constant radius of curvature but is defined by a nonlinear differential equation.

PATENT-4 198 759 Not available NTIS
Department of the Air Force Washington DC
Optical Plummet Azimuth Reference Assembly.
Patent,
Theodore E. Wirtanen, and Ronald M. Hitchcock. Filed 25 Aug 78, patented 22 Apr 80, 5p AD-D007 155/5, PAT-APPL-936 980
Supersedes PAT-APPL-936 980-78, AD-D006 085.
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

This patent describes an optical plummet azimuth reference assembly having a rigid, horizontal support containing a centerline inscribed therein and a pair of upstanding elements mounted on the support located at each end of the centerline. Each upstanding element has a vertical reticle co-planar with the centerline and a horizontal reticle, the vertical and horizontal reticles forming a cross there between. By mounting the azimuth reference assembly directly on an optical plummet with the centerline of the azimuth reference assembly coplanar with the centerline reticle of the optical plummet, the azimuth reference line of an object aligned with the centerline reticle of the optical

plummet can be accurately and quickly ascertained. (Author)

PATENT-4 199 223 Not available NTIS
Department of the Air Force Washington DC
Portable Optical Fiber Coupling Device.
Patent,
Nicholas F. Yannoni. Filed 30 Mar 78, patented 22 Apr 80, 4p AD-D007 160/5, PAT-APPL-891 876
Supersedes PAT-APPL-891 876-78, AD-D004 945.
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

This patent discloses a portable device for coupling optical fibers consisting of an insulative block so designed as to allow a number of optical fibers to come together, a piezoelectric generating means secured to the block and connected to the piezoelectric generator so that optical fibers will be brought together at a point between the electrodes. Electricity generated causes an arc across the electrodes which generates sufficient heat to join the optical fibers. (Author)

PATENT-4 200 875 Not available NTIS
Department of the Air Force Washington DC
Apparatus for, and Method of, Recording and Viewing Laser-made Images on High Gain Retroreflective Sheeting.
Patent,
Demosthenes G. Galanos. Filed 31 Jul 78, patented 29 Apr 80, 6p AD-D007 164/7, PAT-APPL-929 468
Supersedes PAT-APPL-929 468-78, AD-D005 287.
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

This patent discloses from a laser light beam a preselected pattern, that is transparent and/or opaque, on a target made of high gain retroreflective sheeting of the exposed-lens type, with the target inclined at a previously chosen angle; and, thereafter, viewing the recorded image of the pattern (which is recorded on the target by structural alteration, i.e., modification, of the target material that is caused by the laser light beam radiation), solely with the naked eye and in ambient light. The recorded image can be seen only when the target is inclined at the same angle at which the target was positioned when the pattern was recorded by the laser beam radiation on the target. (Author)

PB80-165590 PC **A03**/MF **A01**
Rensselaer Polytechnic Inst., Troy, NY. Dept. of Chemistry.
Colorimetry of Fluorescent Specimens: A State-of-the-Art Report.
Final rept.,
Fred W. Billmeyer, Jr. Oct 79, 49p NBS-GCR-79-185
Sponsored in part by Occupational Safety and Health Administration, Washington, DC.

Accurate measurement of the color of fluorescent specimens, independent of instrument parameters, is very difficult because such materials absorb radiant power in one wavelenght region (the excitation region) and emit power in a region of longer wavelengths (the emission region). There is a complicating overlapping wavelength region in which both excitation and emission take place. Conformance to better color specifications requires irradiation by a source identical to CIE standard daylight illuminant D65, but existing instrument daylight simulators provide a widely discrepant range of results. Calculation methods are described allowing these results to be converted to those for D65 by computation. Instrument modifications and accompanying material standards are proposed for direct measurements corresponding to D65 irradiation. A proposed field test method and instrument are described. Recommendations for implementing these techniques are made for both short-term and long-term time frames.

PB80-170533 PC **A05**/MF **A01**
National Bureau of Standards, Boulder, CO. National Engineering Lab.
An Assessment of the Backscatter Technique as a Means for Estimating Loss in Optical Waveguides,
B. L. Danielson. Feb 80, 88p NBS-TN-1018
Sponsored in part by Aerospace Guidance and Metrology Center, Newark Air Force Station, OH., and Army Communications Command, Fort Monmouth, NJ. Communications Systems Center.

This technical note addresses some of the problems associated with determining the accuracy of the backscatter technique as it is applied to the estimation of attenuation in optical waveguides. The basic theoretical assumptions involved in optical time domain reflectometry are reviewed. The effect on calculated loss values resulting from a departure from these assumptions is then examined. The approach taken is to employ computer modeling of the various scattering and other loss mechanisms using the bulk material properties of optical fibers. Computer responses permit a numerical comparison between the direct (insertion) method of measuring attenuation and several methods of estimating attenuation from analysis of backscatter data. Numerous examples are given of physical effects which can produce discrepancies in attenuation values calculated from backscatter signals. Also, some experimental comparisons are made between backscatter-derived and directly measured attenuation values in step and graded-index optical waveguides. Finally, the conditions necessary for good agreement between the direct and backscatter methods are discussed and suggestions for minimizing these errors are made.

PB80-174568 PC **E06**/MF **A01**
National Bureau of Standards, Washington, DC. National Engineering Lab.
Contributions to Color Science.
Final rept.,
Deane B. Judd, and David L. MacAdam. Sep 79, 765p NBS-SP-545
Prepared in cooperation with Rochester Univ., NY. Inst. of Optics. Library of Congress catalog card no. 76-600132.Color illustrations reproduced in black and white.

This book is a collection of fifty-seven papers written by Deane B. Judd, a staff member of the National Bureau of Standards from 1926 to 1969, and an internationally recognized authority on color. The contents of this collection include some of the major contributions of Dr. Judd to such areas as the measurement and specification of color, spectrophotometry, color appearance and spacing, and color vision. Each paper is preceded by an introduction which provides general commentary on the article and explains the terminology used. Some introductions also direct the reader to related articles in the collection and point out significant developments, such as international agreements, which were based on Judd's work. A list of the more than 200 articles written by Dr. Judd is included in an appendix.

SAND-79-2372C PC **A02**/MF **A01**
Sandia Labs., Albuquerque, NM.
Electron-Beam Induced Absorption and Hardening in Fiber-Optic Waveguides to 1060 nm Laser Pulses.
M. J. Landry, and H. P. Davis. 1980, 16p CONF-800307-1
Contract EY-76-C-04-0789
Fiber optic in the nuclear environment symposium, Adelphi, MD, USA, 25 Mar 1980.

For Corning Glass Work (CGW) and Valtec Corporation (VC) fiber-optic waveguides (FOWs), we have determined the coupling efficiencies (output/input energy) before (R sub 1) and after (R sub 2) electron-beam irradiation, the output energy density, the induced attenuation or loss (L/sub I/) and its decrease as a function of time, and hardening as a function of number of Febetron shots (N/sub T/). The FOWs were electron-beam irradiated with 8.3 to 12.3 J/cm exp 2 for a 2.36 to 2.84 x 10 exp 6 R (exp 60 Co equivalent) dose. The output laser energy density varied from 0.19 to 2.12 kJ/cm exp 2 which was about 50% of the input surface threshold damage level previously measured in similar FOW-s. The values of R sub 1 , 40.1 to 67.0%, were less than those previously measured. The induced attenuation (L/sub I/) as a function of recovery time (after electron-beam irradiation) was linear on log-log plot for a short time (< 2.2 x 10 exp -4 s), changing from 1.8 to 0.2 dB/cm in slightly larger than a one order of magnitude change in time. The rate of recovery decreased with increasing time so that the total change in L/sub I/ was about 3 orders of magnitude in 6 orders of magnitude change in time. A slight hardening (decrease in R sub 1 /R sub 2 occurred in CGW fibers with an increasing number of Febetron electron pulses. (ERA citation 05:013929)

20G. Particle Accelerators

ANL/ES-82 PC **A07**/MF **A01**
Argonne National Lab., IL.
Particle-Accelerator Decommissioning.
J. H. Opelka, R. L. Mundis, G. J. Marmer, J. M. Peterson, and B. Siskind. Dec 79, 129p
Contract W-31-109-ENG-38

Generic considerations involved in decommissioning particle accelerators are examined. There are presently several hundred accelerators operating in the United States that can produce material containing nonnegligible residual radioactivity. Residual radioactivity after final shutdown is generally short-lived induced activity and is localized in hot spots around the beam line. The decommissioning options addressed are mothballing, entombment, dismantlement with interim storage, and dismantlement with disposal. The recycle of components or entire accelerators following dismantlement is a definite possibility and has occurred in the past. Accelerator components can be recycled either immediately at accelerator shutdown or following a period of storage, depending on the nature of induced activation. Considerations of cost, radioactive waste, and radiological health are presented for four prototypic accelerators. Prototypes considered range from small accelerators having minimal amounts of radioactive mmaterial to a very large accelerator having massive components containing nonnegligible amounts of induced activation. Archival information on past decommissionings is presented, and recommendations concerning regulations and accelerator design that will aid in the decommissioning of an accelerator are given. (ERA citation 05:014086)

BNL-26881 PC **A02**/MF **A01**
Brookhaven National Lab., Upton, NY.
Properties of H exp - and D exp - BEAMS from Magnetron and Penning Sources.
T. Sluyters, and V. Kovarik. 1979, 8p CONF-790927-34
Contract EY-76-C-02-0016
Linear accelerator conference, Montauk, NY, USA, 10 Sep 1979.

The quality of negative hydrogen isotope beams are evaluated after extraction from magnetron and Penning sources. The general conclusions of these measurements are that: (a) the beam quality from these plasma sources are adequate for the transport of high current negative ion beams in bending magnets; (b) there is evidence of practically complete space charge neutralization in the drift space beyond the extractor; (c) the beam performance from the Penning source appears to be better compared with the magnetron source; and (d) it is likely that the high electric field gradient and a concave ion emission boundary are responsible for a beam cross-over near the anode aperture, which causes beam divergence practically independent of the extraction geometry. (ERA citation 05:012339)

BNL-26936 PC **A02**/MF **A01**
Oak Ridge National Lab., TN.
X-Ray Monochromator Geometry for Focusing Synchrotron Radiation Above 10 KeV.
C. J. Sparks, Jr., B. S. Borie, and J. B. Hastings. 1979, 18p CONF-790651-8
Contract EY-76-C-02-0016
National conference on synchrotron radiation instrumentation, Gaithersburg, MD, USA, 4 Jun 1979.

The relative merits of crystals versus mirrors for focusing synchrotron radiation at energies above 10 keV are explored. As mirrors have critical angles of reflection typically 1/20 of the Bragg scattering angles for crystals, large mirror surface areas are required. Sagittal focusing is weak for mirrors and limits the amount of radiation inter-

cepted. Crystals bent to a simple cylindrical curvature are shown to accept large divergences of radiation for sagittal focusing. At a magnification near 1/3, the cylindrically curved crystals are shown to make the proper Bragg angle for energies above 5 keV and for divergences larger than 10 mrad and to produce x-ray beams which are approximately focused. (ERA citation 05:014087)

BNL-26951 PC **A02**/MF **A01**
Brookhaven National Lab., Upton, NY.
Linear Accelerator Fuel Enricher Regenerator (LAFER) And Fission Product Transmutor (APEX).
M. Steinberg, J. R. Powell, H. Takahashi, P. Grand, and H. J. C. Kouts. 1979, 20p CONF-791204-15
Contract EY-76-C-02-0016
Miami international conference on alternative energy sources, Miami Beach, FL, USA, 10 Dec 1979.

In addition to safety, two other major problems face the nuclear industry today; first is the long-term supply of fissle material and second is the disposal of long-lived fission product waste. The higher energy proton linear accelerator can assist in the solution of each of these problems. High energy protons from the linear accelerator interact with a molten lead target to produce spallation and evaporation neutrons. The neutrons are absorbed in a surrounding blanket of light water power reactor (LWR) fuel elements to produce fissile Pu-239 or U-233 fuel from natural fertile U-238 or Th-232 contained in the elements. The fissile enriched fuel element is used in the LWR power reactor until its reactivity is reduced after which the element is regenerated in the linear accelerator target/blanket assembly and then the element is once again burned (fissioned) in the power LWR. In this manner the natural uranium fuel resource can supply an expanding nuclear power reactor economy without the need for fuel reprocessing, thus satisfying the US policy of non-proliferation. In addition, the quantity of spent fuel elements for long-term disposal is reduced in proportion to the number of fuel regeneration cycles through the accelerator. The limiting factor for in-situ regeneration is the burnup damage to the fuel cladding material. A 300 ma-1.5 GeV (450 MW) proton linear accelerator can produce approximately one ton of fissile (Pu-239) material annually which is enough to supply fuel to three 1000 MW(e) LWR power reactors. With two cycles of enriching and regenerating, the nuclear fuel natural resource can be stretched by a factor of 3.6 compared to present fuel cycle practice without the need for reprocessing. Furthermore, the need for isotopic enrichment facilities is drastically reduced. (ERA citation 05:010469)

BNL-26962 PC **A02**/MF **A01**
Brookhaven National Lab., Upton, NY.
Linac for the National Synchrotron Light Source.
K. Batchelor, J. Bittner, T. Dickinson, V. Racaniello, and J. Sheehan. 1979, 7p CONF-790927-35
Contract EY-76-C-02-0016
Linear accelerator conference, Montauk, NY, USA, 10 Sep 1979.

The nominally 100 MeV electron linear accelerator to be used as an injector for the booster synchrotron of the National Synchrotron Light Source is described. The machine utilizes a combination of Varian and SLAC accelerating guides and is interfaced by means of a microprocessor-based Intel Multibus system, to the Data General central control computer. Provision for emittance and momentum measurement is provided in the transport line between the linac and the booster synchrotron. (ERA citation 05:012340)

BNL-27004 PC **A03**/MF **A01**
Brookhaven National Lab., Upton, NY.
Report of Workshop on Windowless Gas Phase Beam Line at the National Synchrotron Light Source, June 29, 1979.
J. R. Grover, R. B. Klemm, and J. B. A. Mitchell. 1979, 41p
Contract EY-76-C-02-0016

A workshop was held on the 29th June 1979 to present the design of the Windowless Gas Phase Beamline for the National Synchrotron Light Source and to discuss the proposed research to be performed using this equipment. Participants included scientists from the Brookhaven National Laboratory, Oak Ridge National Laboratory, Yale University, the University of Rochester, and United Technologies Research Center. The report summarizes the presentations that were made and also includes contributions from scientists who were unable to attend. (ERA citation 05:012341)

BNL-27030 PC **A03**/MF **A01**
Brookhaven National Lab., Upton, NY.
Overview of Colliding Beam Facilities.
J. C. Herrera, and M. Month. 1979, 28p CONF-790318-7
Contract EY-76-C-02-0016
Symposium on nonlinear dynamics and the beam-beam interaction, Upton, NY, USA, 19 Mar 1979.

A review is presented of the colliding beam facilities in existence today. The major high energy physics facilities around the world are described, and a view is presented of the beam collisions in which the instruments used to make the beams collide and those used to detect the products of particle interactions in the beam overlap region are described. (ERA citation 05:012342)

BNL-27035 PC **A02**/MF **A01**
Brookhaven National Lab., Upton, NY.
Electromagnetic Interaction of Colliding BEAMS in Storage Rings.
J. C. Herrera. 1979, 13p CONF-790318-8
Contract EY-76-C-02-0016
Symposium on nonlinear dynamics and the beam-beam interaction, Upton, NY, USA, 19 Mar 1979.

When the beams cross each other in the intersecton region of a storage ring, two distinct effects occur. A particle of one beam may undergo a fundamental interaction with a particle of the other beam. The average number of such events is equal to the product of the machine luminosity and the particle-particle total cross section. It is, of course, these particle interactions which the experimental physicist studies. In contrast to what happens for these fundamental interactions, a particle of one beam passing through the interaction region will always be influenced by the electric and magnetic fields produced by the entire other beam. Clearly, this classical electromagnetic interaction between the two beams will perturb the motion of the particles circulating in the machine. It is the purpose of this paper to present the basic aspects of this beam-particle force. The effect of this electrical force is quite different in the case of continuous (unbunched) proton beams which cross each other at the angle (as in the ISR at CERN and in ISABELLE at Brookhaven), as compared to the case of electron-positron bunches which collide head on (as in the SPEAR II Ring and in PETRA and PEP). (ERA citation 05:012325)

BNL-27091 PC **A02**/MF **A01**
Brookhaven National Lab., Upton, NY.
Some Remarks on Plasma Instabilities in Electron and Positron Colliding BEAMS.
C. Pellegrini, and M. Tigner. 1979, 3p CONF-7910125-1
Contract EY-76-C-02-0016
ICFA workshop on possibilities and limitations of accelerators and detectors, Les Diablerets, Switzerland, 4 Oct 1979.

The limitations on the intensity of colliding beams due to the development of plasma instabilities during the collision time are examined for a storage ring and a colliding linacs configuration. It is found that this effect can limit the luminosity for colliding linacs but not for storage rings. (ERA citation 05:014065)

BNL-27123 PC **A02**/MF **A01**
Brookhaven National Lab., Upton, NY.
Limitations on Anti p-p Luminosity with Direct Injection and Stacking of Antiprotons.
E. D. Courant, and L. C. Teng. 1979, 6p CONF-7910125-2
Contract EY-76-C-02-0016
ICFA workshop on possibilities and limitations of accelerators and detectors, Les Diablerets, Switzerland, 4 Oct 1979.

If protons of very high energy impinge on a target, a large part of the resulting antiprotons are sufficiently collimated to be injectible into a stacking and accelerating ring. They can then be stacked and injected into the main proton accelerator so as to produce anti p-p collisions without low energy antiproton cooling. A scheme is presented for the VBA, where 20 TeV protons produce 9 x 10 exp -4 antiprotons per proton at 100 GeV, which are then stacked, accelerated to 1 TeV, and injected into the main ring. With 16 proton pulses of 10 exp 15 protons, one obtains a luminosity of the order of 10 exp 32 cm exp -2 sec exp -1 with a beam-beam tune shift of 10 exp -3 per interaction region. The beams are bunched into 1000 bunches; the orbits are separated by means of relatively modest electostatic electrodes. (ERA citation 05:014066)

BNL-27128 PC **A02**/MF **A01**
Brookhaven National Lab., Upton, NY.
Description of the M1 MEQALAC and Operating Results.
R. Adams, J. Boruch, and A. Bertsche. 1979, 22p CONF-7910122-6
Contract EY-76-C-02-0016
Heavy ion fusion workshop, Berkeley, CA, USA, 29 Oct 1979.

MEQALAC stands for Multiple Electrostatic Quadrupole Array Linear Accelerator. The first model, M1, was designed, built, and tested in a three month period from July to October 1979. Within a week of operation a Xenon output current of 85% of the calculated space-charge limit was obtained. In the following sections, the M1 components and operation are described. Some of the design choices were made to allow hand-fabrication with available tools (principally a table-top lathe and a table-top drill press), while others were influenced by the ion source development at hand. The major goal was to demonstrate the MEQALAC principle of accelerating multiple beams through arrays of strong focussing electrostatic quadrupoles. Xenon was used since it demonstrates the principles of a low beta linac as needed for the Heavy Ion Fusion program, without the complications of a heavy-metal ion source. (ERA citation 05:012343)

BNL-27129 PC **A02**/MF **A01**
Brookhaven National Lab., Upton, NY.
Excitation of Higher Order Modes in Alverez Linac Structures.
J. T. Keane. 1979, 9p CONF-7910122-7
Contract EY-76-C-02-0016
Heavy ion fusion workshop, Berkeley, CA, USA, 29 Oct 1979.

The excitation of higher order TM sub 01 modes produced during the rf build-up period has been observed and compensated for over the years. Synchronous beam excitation of these modes has not been observed. A possible, though unlikely, mechanism for beam excitation has been presented. This would occur only in a very specific section of the machine (low beta). There is no strong reason to expect poor beam quality for currents near 160 milliamperes but further studies into the effect of heavy beam loading should be pursued. (ERA citation 05:012326)

BNL-51094 PC **A02**/MF **A01**
Brookhaven National Lab., Upton, NY.
MEQATRON: A High-Power High-Frequency RF Source.
A. W. Maschke. 28 Sep 79, 11p
Contract EY-76-C-02-0016

MEQATRON is an acronym for a multiple-beam electrostatic-quadrupole-focused array of electron beams. Conventional electron beam devices consist principally of single electron beams. In this paper the single-beam space-charge limitations are discussed, and a relationship for power flux (W/m exp 2) is obtained. Several features of the multiple-beam approach become clear at once. Because the multiple-beam approach removes the current limitation on performance, it is possible to design high-current low-voltage tubes. This fracture is important for low-frequency (200 MHz, say) klystrons. Another feature of the multiple-beam approach relates to the very small sizes (1 to 2 mm, say) associated with each beam. This offers the possibility of developing high-power rf sources in the millimeter wavelength region. (ERA citation 05:012327)

BNL-51119 PC **A02**/MF **A01**
Brookhaven National Lab., Upton, NY.

Formulary for MEQALAC Design.
A. W. Maschke. 27 Nov 79, 6p
Contract EY-76-C-02-0016

From the space-charge limits for quadrupole transport systems discussed in an earlier report, some simple relations are obtained that will assist in the design of practical systems. (ERA citation 05:012328)

CONF-790743-9 PC **A03**/MF **A01**
Argonne National Lab., IL.
Heavy-Ion-Linac Post-Accelerators.
L. M. Bollinger. 1979, 39p
Contract W-31-109-ENG-38
Symposium on heavy ion physics from 10-200 MeV/A, Upton, NY, USA, 16 Jul 1979.

The main features of the tandem-linac system for heavy-ion acceleration are reviewed and illustrated in terms of the technology and performance of the superconducting heavy-ion energy booster at Argonne. This technology is compared briefly with the corresponding technologies of the superconducting linac at Stony Brook and the room-temperature linac at Heidelberg. The performance possibilities for the near-term future are illustrated in terms of the proposed extension of the Argonne booster to form ATLAS. (ERA citation 05:012344)

CONF-7909111-1 PC **A02**/MF **A01**
Argonne National Lab., IL.
History of the Polarized Beam.
E. F. Parker. 1979, 17p
Contract W-31-109-ENG-38
Symposium on the history of the ZGS, Argonne, IL, USA, 13 Sep 1979.

In 1973, the first high energy polarized proton beam was developed at the Argonne Zero Gradient Synchrotron (ZGS). It operated very successfully and productively until 1979 when the ZGS was shut down permanently. This report describes the development, characteristics, and operations of this facility. (ERA citation 05:012345)

CONF-7910119-1 PC **A02**/MF **A01**
Argonne National Lab., IL.
Heavy Ion Stripping by Wrinkled Carbon Foils.
P. K. Den Hartog, J. L. Yntema, G. E. Thomas, and W. Henning. 1979, 17p
Contract W-31-109-ENG-38
Annual conference of the I.N.T.D.S. Boston, MA, USA, 1 Oct 1979.

The use of mechanically slackened, or wrinkled, foils as stripper foils in the tandem electrostatic accelerator is discussed as a means of increasing foil life is discussed. Performance of such foils is shown. (ERA citation 05:010471)

COO-2114-38 PC **A02**/MF **A01**
Colorado Univ. at Boulder. Dept. of Physics and Astrophysics.
Elementary Particles and High Energy Phenomena. Progress Report, January 1979-December 1979.
D. Bartlett. Jan 80, 18p
Contract EY-76-C-02-2114

The experimental program in 1979 was directed toward the preparation of two major detectors: the new multiparticle spectrometer facility for the Fermilab tagged photon beam and the lepton/total energy detector (MAC) for PEP. The two large Cerenkov counters were installed and made operational during a test beam run at Fermilab and substantial progress was made on the track reconstruction programs. The MAC central drift chamber was completed and delivered at SLAC and operational tests were started. Work produced by the theory group included studies of color separation in multi-hadron jet production, diffractive jet production in photo-induced reactions, the relation between the several generations of leptons and quarks, tests of unified gauge theories, gauge hierarchies, and several problems in grand unified theories. (ERA citation 05:012346)

EFI-154(76) PC **A02**/MF **A01**
Erevanskii Fizicheskii Inst. (USSR).
Stability of Particles Motion and Acceleration in the Field of Two Linearly Polarized Electromagnetic Waves in a Medium.
G. A. Nagorskii, and M. L. Petrosyan. 1976, 20p
In Russian.
U.S. Sales Only.

A method of compensation is considered for the instability of particle acceleration in the field of an electromagnetic wave by means of a second electromagnetic wave which is also in resonance with an accelerated particle. The motion stability was analyzed without taking into account multiple scattering of particles on atoms of a medium. The complete phase volume of particle acceptance is evaluated by way of analysis of the motion stability in longitudinal and transverse directions. A particle acceptance coefficient formula has been derived, and a numerical example is given for electron acceleration from 5 to 10 GeV in a liquid-hydrogen medium. (Atomindex citation 09:408450)

EFI-160(76) PC **A02**/MF **A01**
Erevanskii Fizicheskii Inst. (USSR).
Liquid Hydrogen Target.
K. Sh. Agababyan, S. L. Arakelyan, R. T. Mina, and V. K. Yatsyno. 1976, 19p
In Russian.
U.S. Sales Only.

The design of a liquid-hydrogen target comprising a hydrogen liquefier and a target head is described. The hydrogen is liquefied by condensation of a helium-vapor cooled surface of a heat exchanger housed inside a condenser. The hydrogen liquefaction efficiency has been measured. The obtained liquefaction coefficient practically coincides with the design value and amounts at the liquefaction rate of up to 0.35 l/hr to 1 l of liquid hydrogen per 2.8 l of liquid helium. The high efficiency of the liquefier and the low evaporation rate of hydrogen from the target, which is about 0.03 to 0.05 m exp 3 /hr under normal conditions, have made it possible to extend the time interval between repeated fillings of helium. Now the useful time of the liquid-hydrogen target operation is over two days. (Atomindex citation 09:408393)

EFI-163(76) PC **A02**/MF **A01**
Erevanskii Fizicheskii Inst. (USSR).
Radiation in a Shorted Waveguide with a Dielectric Plate.
G. G. Oksuzyan, and E. S. Pogosyan. 1976, 11p
In Russian.
U.S. Sales Only.

A formula has been derived for calculating the radiation loss energy of a charged particle moving along the axis of a semi-infinite waveguide shorted by an ideally conducting wall. The waveguide is filled with a dielectric medium. Particular cases of the relationship between the radiation intensity of electron bunches and the waveguide dispersion for a teflon were calculated. An experiment was carried out at the second harmonic of the accelerating field frequency of a linear accelerator. The radiator calculated in this paper is convenient for usage and can be connected directly to an antenna system. (Atomindex citation 09:408453)

FERMILAB-80/1 PC **A02**/MF **A01**
Fermi National Accelerator Lab., Batavia, IL.
Fermilab Report.
Jan 80, 21p
Contract EY-76-C-02-3000

Activities at Fermilab during 1979 are briefly described, including main ring magnet performance, operations summary, beam utilization summary, and a list of manuscripts and notes prepared from December 13, 1979 to January 14, 1980. (ERA citation 05:014089)

IFVE-PPK-76-168 PC **A02**/MF **A01**
Gosudarstvennyi Komitet po Ispol'zovaniyu Atomnoi Energii SSSR, Serpukhov. Inst. Fiziki Vysokikh Energii.
Software of Spiral Reader System for Image Processing from the Mirabelle Chamber.
N. E. Detinenko, L. L. Zakamskii, A. A. Ivanov, V. G. Kuz'menko, and A. F. Luk'yantsev. 1976, 7p
In Russian.
U.S. Sales Only.

The software of the spiral meter includes a set of the programs for the PDP-9 computer and a set of the programs for the ICh-1906A computer intended for measurement and processing of the pictures taken with the aid of the MIRABEL camera. The overlay system and control programs for the PDP-9 computer is described which provide for measurement of the pictures on the spiral meter under various conditions. (Atomindex citation 10:421687)

INR-1564/17/C/B PC **A02**/MF **A01**
Institute of Nuclear Research, Warsaw (Poland).
Stand No. 1 for Pulse Radiolysis at the Linear Electron Accelerator LAE 13/9 Zeran.
Z. P. Zagorski, J. Grodkowski, Z. Zimek, and W. Roszczynko. 1975, 19p
In Polish.
U.S. Sales Only.

A detailed description of the first routine stand for pulse radiolysis is given. It is using the generation of short living species by the 0.5 - 5.5 mu s pulse of 5-13 MeV electrons. (Atomindex citation 10:455742)

JINR-R-9-10054 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Dept. of New Acceleration Methods.
First Stage of Adjustment of the Heavy Ion Collective Accelerator Prototype. Part 2.
V. P. Sarantsev, V. S. Aleksandrov, and L. N. Belyaev. 1976, 14p
In Russian.
U.S. Sales Only.

The results of experiments on electron ring compression in a heavy ion collective accelerator prototype adgezator have been given. Electrons were injected in a pulsed magnetic field over 40 cm radius. Injection current was 200-300 A at 1.8 MeV electron energy and 20 ns pulse duration. To determine an equilibrium radius and a radial size of a ring cross-section the various type probes transferred along the radius were used. Ring charge and bremsstrahlung gamma -radiation were registered. As a result of elimination of azimuthal heterogeneities of a magnetic field and magnetic system parameter correction the heavy ion collective accelerator prototype adgezator provides for > or approximately 10 exp 13 capture of electrons and electron ring formation with the following parameters in the end of compression: 4 cm finite radius and radial and azimuthal sizes of 2-3 mm. (Atomindex citation 09:408461)

JINR-10-11390 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of High Energy.
Acquisition and Display of Data from One-Channel Ionization Monitor of the Accelerated Particle Beam of JINR Synchrophasotron.
V. I. Volkov, I. F. Kolpakov, I. I. Kulikov, E. A. Silaev, and V. M. Slepnev. 1978, 7p
In Russian.
U.S. Sales Only.

A setup for acquisition and display of data from one-channel ionization monitor of the accelerated particle beam of JINR synchrophasotron is described. In the detector for detecting ionization products (ions) of residual gas the synchrophasotron chamber a secondary electron multiplier (SEM) of a channel type is used. The setup electronic operates on=line with the ES-1010 computer; it detects the frequency of a pulse entering from SEM and permits to obtain information on the intensity of particle circulating beam in an appropriate form on GD-71 graphical display screen. A scheme and parameters of differential amplifier of the former are given which permits to pickup a signal from SEM on the pulse background. A possibility was proved experimentally of operation with the monitor at the intensity of approximately 10 exp 6 particles per cycle for helium nuclei accelerated beam. (Atomindex citation 09:408469)

JINR-9-9901 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of High Energy.
One-Step Acceleration of Deuterons and alpha -Particles at the JINR Synchrophasotron.
A. I. Mikhailov, G. P. Puchkov, and K. V. Chekhlov. 1976, 18p
In Russian.
U.S. Sales Only.

The problems are considered which are related to one-step acceleration mode of deuterons and

alpha -particles at the JINR synchrophasotron. The one-step mode of acceleration of deuteron and alpha -particles has been realized by widening the driving oscillator frequency range and control frequency tuninq law of the accelerating field. The one-step acceleration mode turns out to be simple in tuning, reliable in operation and allows by many times to increase deuteron beam and alpha -particle intensity compared with the two-step acceleration mode. (Atomindex citation 09:408446)

KEK-77-29 PC **A04**/MF **A01**
National Lab. for High Energy Physics, Oho (Japan).
High Power RF System for the KEK Booster Synchrotron.
E. Ezura, H. Nakanishi, K. Kudo, M. Toda, and K. Ebihara. Mar 77, 66p
U.S. Sales Only.

Design features and procedures of the high-power RF system for the KEK booster synchrotron are described. The system consists of an RF power amplifier, a ferrite-loaded accelerating cavity and an automatic cavity-tuning system. The RF voltage program and the ferrite properties, which are the determining factors for the general design and the operational performance of the system, are discussed. Procedures for estimating the power requirements are presented for both the RF power amplifier and the ferrite bias supply. A general description of the system is also given. (Atomindex citation 10:445610)

KFK-2576 PC **A03**/MF **A01**
Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Inst. fuer Kernphysik.
High Power RF Coupling Line for the Karlsruhe Superconducting Proton Linear Accelerator.
D. Schulze. Jan 78, 31p
In German.
U.S. Sales Only.

For the purpose of electronic frequency control of a superconducting 90 MHz helix resonator a RF coupling line is needed, that can carry a reactive power of 10 kVA. The coupling line shall connect a tuner working at room temperature with the superconducting resonator in such a way, that a minimum of additional heat is conducted into the helium bath. It is shown theoretically and experimentally, that this problem can be solved by a capacitive gap with small coupling capacity. The formulas for the parameter of the gap and the current and voltage distribution are general, such that the results might be applied to other problems too. (Atomindex citation 09:408465)

LA-UR-79-3178 PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
RSX Handler for Transferring Large Blocks of Data Between Tasks.
T. Kozlowski, M. Oothoudt, and D. Daniels. 1979, 3p CONF-791215-2
Contract W-7405-ENG-36
DECUS 1979 fall symposium, San Diego, CA, USA, 10 Dec 1979.

A pseudo-device handler was written which allows the transfer of up to 64K byte blocks of data between tasks. The basic mechanism is as follows: one task issues a read QIO which references another task to which the data are to be sent. This second task issues a write QIO referencing the first task. The handler resolves the two QIO's may be issued in any sequence and with any separation in time. Such a handler is useful in an environment in which it is important to conserve active page registers and virtual address space. (ERA citation 05:009003)

LA-UR-79-3373 PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
Limitations of the Disk-and-Washer Structure.
S. O. Schriber, and J. M. Potter. 1979, 5p CONF-790927-33
Contract W-7405-ENG-36
Linear accelerator conference, Montauk, NY, USA, 10 Sep 1979.

A preliminary analysis of measurements on beta = 0.6 and 1.0 disk-and-washer linac cavities has indicated some limitations on washer support methods; in particular, that the use of radial supports should be avoided until further testing is completed. (ERA citation 05:009001)

LA-UR-80-309 PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
Emittance Growth in RF Linacs.
R. A. Jameson. 1979, 11p CONF-7910122-5
Contract W-7405-ENG-36
Heavy ion fusion workshop, Berkeley, CA, USA, 29 Oct 1979.

As the space-charge limit is approached, the current that can be accelerated in an rf linac and the output emittance that can be expected are discussed. The role of the envelope equations to estimate limits is outlined. The results of numerical experiments to explore general properties of emittance growth are given. (ERA citation 05:012329)

LA-UR-80-310 PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
Summary of Low- beta Linac Working Group.
R. A. Jameson. 1979, 9p CONF-7910122-4
Contract W-7405-ENG-36
Heavy ion fusion workshop, Berkeley, CA, USA, 29 Oct 1979.

A summary is presented of the feasibility studies of using multiple linacs at the low- beta end with funneling of the ion beams to a single linac as beta increases. (ERA citation 05:012348)

LA-UR-80-342 PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
Rf Linac Approach to Heavy Ion Fusion.
D. A. Swenson. 1979, 7p CONF-7910122-3
Contract W-7405-ENG-36
Heavy ion fusion workshop, Berkeley, CA, USA, 29 Oct 1979.

The necessary properties of funneling particle beams from multiple accelerators into combined beams having higher current are outlined, and methods are proposed which maximize the efficiency of this process. A heavy ion fusion driver system example is presented which shows the large advantages in system efficiency to be gained by proper funneling. (ERA citation 05:012349)

LA-8109-MS PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
Ice Targets.
C. Pacheco, C. Stark, N. Tanaka, D. Hodgkins, and J. Barnhart. Dec 79, 10p
Contract W-7405-ENG-36

This report presents a description of ice targets that were constructed for research work at the High Resolution Spectrometer (HRS) and at the Energetic Pion Channel and Spectrometer (EPICS). Reasons for using these ice targets and the instructions for their construction are given. Results of research using ice targets will be published at a later date. (ERA citation 05:012347)

LBL-9841 PC **A02**/MF **A01**
California Univ., Berkeley. Lawrence Berkeley Lab.
Low-Noise Wide-Band Amplifier System for Stochastic Beam Cooling Experiments.
B. Leskovar, and C. C. Lo. Oct 79, 11p CONF-791037-15
Contract W-7405-ENG-48
IEEE nuclear science symposium, San Francisco, CA, USA, 17 Oct 1979.

A new low-noise wide-band power amplifier system has been developed for stochastic beam cooling experiments. The system incorporates a low-noise preamplifier with a noise figure of 1.9 dB over a bandwidth range of 20 to 300 MHz, wideband driver and buffer stages, a frequency characteristics shaping network, a remotely controlled wide-band attenuator with 0.1 dB resolution, a remotely controlled high resolution adjustable delay line, and a wide-band solid-state output power amplifier. The amplifier system has a maximum voltage gain of 140 dB over a bandwidth from 1.5 to 310 MHz, a signal group delay of 55.5 ns, and a c.w. output power level of 75 W. Particular attention was paid to minimizing the signal propagation time delay of the amplifier system, the propagation time delay change as a function of the system gain, and harmonic and intermodulation distortions. Using a new wide-band electron bombarded semiconductor output amplifier, the system will have a bandwidth from 30 to 400 MHz, a signal group delay of 37 ns and an output power of 100 W. (ERA citation 05:009004)

ORO-3956-9 PC **A02**/MF **A01**
Tennessee Univ., Knoxville.
Bubble Chamber Studies of Hadron and Photon Interactions. Progress Report, April 1, 1979-March 31, 1980.
W. M. Bugg, G. T. Condo, T. Handler, and E. L. Hart. 1980, 12p
Contract EY-76-S-05-3956

Research during the period April 1979 through March 1980 by the University of Tennessee Bubble Chamber Group is described. (ERA citation 05:014090)

PAT-APPL-6-003 561 PC **A02**/MF **A01**
Department of Energy, Washington, DC.
Method and Means for Measurement and Control of Pulsed Charged Beams.
Patent Application,
R. N. Lewis. Filed 15 Jan 79, 18p
Contract W-31-109-ENG-38
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A beam of bunches of charged particles is controlled by generating a signal in response to the passage of a bunch and adding to that signal a phase-flipped reference signal. The sum is amplified, detected, and applied to a synchronous detector to obtain a comparison of the phase of the reference signal with the phase of the signal responsive to the bunch. The comparison provides an error signal to control bunching. (ERA citation 05:019245)

PAT-APPL-6-136 227 PC **A02**/MF **A01**
Department of the Navy Washington DC
Generation of Intense, High-Energy Ion Pulses by Magnetic Compression of Ion Rings.
Patent Application,
Christou A. Kapetanskos. Filed 1 Apr 80, 19p
AD-D007 149/8
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foriegn licensing. Copy of application available NTIS.

This document discloses a system based on the magnetic compression of ion rings, for generating intense (high-current), high-energy ion pulses that are guided to a target without a metallic wall or an applied external magnetic field includes a vacuum chamber; an inverse reflex tetrode for producing a hollow ion beam within the chamber; magnetic coils for producing a magnetic field, B sub 0 along the axis of the chamber; a disc that sharpen a magnetic cusp for providing a rotational velocity to the beam and causing the beam to rotate; first and second gate coils for producing fast-rising magnetic field gates, the gates being spaced apart, each gate modifying a corresponding magnetic mirror peak (near and far peaks) for trapping or extracting the ions from the magnetic mirror, the ions forming a ring or layer having rotational energy; a metal liner for generating by magnetic flux compression a high, time-varying magnetic field, the time-varying magnetic field progressively increasing the kinetic energy of the ions, the magnetic field from the second gate coil decreasing the far mirror peak at the end of the compression for extracting the trapped rotating ions from the confining mirror; and a disc that sharpen a magnetic half-cusp for increasing the translational velocity of the ion beam. The system utilizes the self-magnetic field of the rotating, propagating ion beam to prevent the beam from expanding radially upon extraction. (Author)

RL-78-023 PC **A02**/MF **A01**
Science Research Council, Chilton (England). Rutherford Lab.
MWPC Readout Equipment for the European Muon Collaboration.
D. J. White. Mar 78, 24p
U.S. Sales Only.

MWPC readout equipment was designed and constructed by members of RL staff for use on the EMC experiment, to be run at CERN. The equip-

ment was designed to fit in the space available and the readout format was designed to be compatible with other equipment to be used on the same experiment. A brief description of the equipment is given, followed by detailed information and specifications for each of the component parts. (Atomindex citation 09:408472)

RL-78-070 PC **A02**/MF **A01**
Science Research Council, Chilton (UK). Rutherford Lab.
Spallation Target-Moderator-Reflector Studies on Nimrod.
B. C. Boland, A. Carne, G. C. Stirling, and A. D. Taylor. Nov 78, 18p
U.S. Sales Only.

A mock-up spallation target assembly experiment (MUSTA), designed to assess the optimal conditions for thermal neutron production from proton spallation systems, has been carried out on the Nimrod accelerator under conditions appropriate to the design for the Spallation Neutron Source. The results for neutron production confirm earlier predictions, and are in good agreement with Monte Carlo simulation calculations. (Atomindex citation 10:445590)

RL-78-113 PC **A02**/MF **A01**
Science Research Council, Chilton (England). Rutherford and Appleton Labs.
Design of the Injection Beamline for the SNS.
A. D. Marshall. Dec 78, 25p
U.S. Sales Only.

The injected beam transport system for the SNS is described and design constraints are examined. The layout, stability and adjustability of the beam line are discussed. (Atomindex citation 10:463555)

SAND-79-1945C PC **A02**/MF **A01**
Sandia Labs., Albuquerque, NM.
Experimental Investigations of High Current Linear Ion Accelerators.
S. Humphries, Jr. 1980, 3p CONF-800208-3
Contract EY-76-C-04-0789
Tropical meeting on inertial confinement fusion, San Diego, CA, USA, 26 Feb 1980.

Experiments on high current pulsed linear ion accelerators are described. A five-stage device, Pulselac B, has produced 4 kA of C+ at 700 keV for a 0.5 microsecond pulse. (ERA citation 05:010472)

SLAC-PUB-2425 PC **A02**/MF **A01**
Stanford Univ., CA.
Results from the Crystal Ball Detector at SPEAR.
E. D. Bloom. Nov 79, 14p CONF-790885-12
Contract EY-76-C-03-0515
International symposium on lepton and photon interactions at high energy, Batavia, IL, USA, 23 Aug 1979.

The Crystal Ball detector is a device particularly suited to the measurement of photons with energies lower than 1 GeV. The detector has as its principal component a 16 radiation length thick, highly segmented shell of NaI(Tl) surrounding cylindrical, proportional, and magnetostrictive spark chambers. The main Ball and various elements of the central chambers cover 94% of 4 pi sr. Segmented endcap NaI(Tl) detectors of 20 radiation lengths behind magneto strictive spark chambers supplement the main Ball. The Ball and endcaps close the solid angle for charged particle and photon detection to 98% of 4 pi sr. In addition, detectors of interspersed iron and proportional tubes provide for mu - pi separation over 15% of 4 pi sr, about theta/sub CM/ = 90 exp 0 . In this report preliminary results are presented from the data obtained. In particular, QED at E/sub CM/ = 6.5 GeV, R/sub hadron/ and related inclusive distributions, eta branching fractions at J/psi and psi'', and a detailed study of the psionium system are discussed. (ERA citation 05:010473)

SLAC-PUB-2443 PC **A02**/MF **A01**
Stanford Linear Accelerator Center, CA.
SAMAC Program: The Computer Support for a Stand-Alone Monitoring and Control System.
C. A. Logg. Dec 79, 12p CONF-791215-5
Contract EY-76-C-03-0515
DECUS 1979 fall symposium, San Diego, CA, USA, 10 Dec 1979.

The high energy physics experiments at SLAC require constant monitoring and control of the numerous components contained in the particle detection apparatus. This paper describes a basic hardware configuration and operating system which have been designed and impiemented to satisfy the monitoring and control requirements of the many different setups used in these high energy physics experiments. It is based on the LSI-11 microprocessor with up to one million words of RAM and EPROM which are interchangeably mappable into the normal LSI-11 RAM/EPROM address space of 28K words. The entire system is modular in hardware and software so that it can easily be tailored to an individual experiment. The human interface is such that little training is required for effective use of the system. (ERA citation 05:012331)

20H. Particle Physics

ANL/NDM-50 PC **A02**/MF **A01**
Argonne National Lab., IL.
Prompt-Fission-Neutron Spectra of exp 233 U, exp 235 U, exp 239 Pu and exp 240 Pu Relative to That of exp 252 Cf.
A. Smith, P. Guenther, G. Winkler, and R. McKnight. Sep 79, 21p
Contract W-31-109-ENG-38

The prompt-neutron-induced-fission spectra of exp 233 U, exp 235 U, exp 239 Pu, and exp 240 Pu are measured relative to the prompt-spontaneous-fission-neutron spectrum of exp 252 Cf. The fission of exp 233 U, exp 235 U, and exp 239 Pu is induced by approx. = 550-keV neutrons, and that of exp 240 Pu, by approx. = 850-keV neutrons. The emitted fission neutrons are observed over the energy range less than or equal to 0.5 to 10.0 MeV by use of time-of-flight techniques. Analysis of the measured values indicates that the average-fission-neutron energies are -123 +- 30 (exp 233 U), -157 +- 24 (exp 235 U), -76 +- 29 (exp 239 Pu), and -46 +- 29 (exp 240 Pu) keV relative to the energy for exp 252 Cf. The experimental results are compared with those of ENDF/B-V, and a simple behavior of average-prompt-fission-neutron energies is suggested. (ERA citation 05:014510)

BNL-NCS-27050 PC **A02**/MF **A01**
Brookhaven National Lab., Upton, NY.
Status of Radiative Widths, Neutron Strength Functions and Improved Evaluation Using the Lane-Lynn Theory.
S. Mughabghab. 1979, 16p CONF-791223-4
Contract EY-76-C-02-0016
NEANDC specialist meeting on neutron cross sections of fission product nuclei, Bologna, Italy, 12 Dec 1979.

The s- and p-wave neutron strength functions and average radiative widths of fission product nuclides are reviewed. The direct capture mechanism of Land and Lynn is quantitatively varified for the two reactions exp 42 Ca(n, gamma) exp 43 Ca and exp 136 Xe(n, gamma) exp 137 Xe. Thermal capture cross sections of exp 132 Te and exp 126 Sn are estimated with the aid of the Lane-Lynn theory. 7 figures, 1 table. (ERA citation 05:014494)

BNL-NCS-27119 PC **A02**/MF **A01**
Brookhaven National Lab., Upton, NY.
Possible Oblate Rotational Bands in N=84 Nuclides.
L. K. Peker, and J. K. Tuli. 1980, 3p CONF-800213-7
Contract EY-76-C-02-0016
Band structure and nuclear dynamics conference, New Orleans, LA, USA, 28 Feb 1980.

Strong-coupling rotational bands built on 11 exp - (33/2 exp + for odd-A) states with configuration nu (i/sub 13/2/, h/sub 9/2/) (pi (h/sub 11/2/) nu (i/sub 13/2/, h/sub 9/2/) are off-A) were identified in N=84 nuclei with Z less than or equal to 65. These are the first levels observed in this region with proven oblate deformation. 3 figures. (ERA citation 05:014495)

BNL-26961 PC **A03**/MF **A01**
Brookhaven National Lab., Upton, NY.
Production of Double Hypernuclei Via the (K Exp - , K exp +) Reaction.
C. B. Dover. 1979, 29p CONF-7909118-2
Contract EY-76-C-02-0016
International conference on hypernuclear and low energy kaon physics, Jablonna, Poland, 11 Sep 1979.

Cross section estimates are presented for the formation of lambda lambda and xi hypernuclei in the (K exp - , K exp +) strangeness exchange reaction, both for transitions to particular low-lying final states and also for the summed cross section. The problem of the well depth and damping width for a xi exp - in nuclear matter is also addressed. (ERA citation 05:014472)

BNL-27066 PC **A04**/MF **A01**
Brookhaven National Lab., Upton, NY.
Updated Estimates of W Production in Pp and Anti Pp Interactions.
F. E. Paige. Oct 79, 53p CONF-7910103-3
Contract EY-76-C-02-0016
Workshop on the production of new particles in super high energy collisions, Madison, WI, USA, 22 Oct 1979.

Cross section estimates are given for W production in the Weinberg-Salam model with sin exp 2 theta/sub W/ = 0.23 and six quark flavors. Modifications of the Drell-Yan model due to QCD are taken into account. 45 references, 15 figures. (ERA citation 05:014473)

BNL-27154 PC **A02**/MF **A01**
Brookhaven National Lab., Upton, NY.
Hypernuclear Physics Research at Brookhaven.
M. May. 1979, 15p CONF-7909118-1
Contract EY-76-C-02-0016
International conference on hypernuclear and low energy kaon physics, Jablonna, Poland, 11 Sep 1979.

This paper describes the results of a recently completed study of the hypernucleus exp 12 /sub lambda /C. The observed formation of hypernuclear states at large momentum is compared with theoretical expectations. Future directions of the research program at Brookhaven are outlined. (ERA citation 05:014466)

BONN-HE-78-11 PC **A03**/MF **A01**
Bonn Univ. (Germany, F.R.). Physikalisches Inst.
Can Coupling Constants Be Related.
S. Nandi, and W. C. Ng. Jun 78, 39p
U.S. Sales Only.

We analyze the conditions under which several coupling constants in field theory can be related to each other. When the relation is independent of the renormalization point, the relation between any g and g' must satisfy a differential equation as follows from the renormalization group equations. Using this differential equation, we investigate the criteria for the feasibility of a power-series relation for various theories, especially the Weinberg-Salam type (including Higgs bosons) with an arbitrary number of quark and lepton flavors. (Atomindex citation 10:439666)

BONN-HE-78-14 PC **A02**/MF **A01**
Bonn Univ. (Germany, F.R.). Physikalisches Inst.
Spontaneous Symmetry Break-down in Finite Systems.
K. Dietz. Jul 78, 15p
U.S. Sales Only.

A phi exp 4 -theory interacting with a (non-local) external potential strong enough to induce zero mass modes is considered. Such a theory has served as a model for pi -condensation and, in solid state physics, to explain giant magnetic moments in metals. We show that such a zero mass mode does not induce a phase transition to a condensed state in systems, like nuclei or finite impurity centers, the spatial extension of which is microscopically small in the sense that the inverse inherent mass scales determine its size. (Atomindex citation 10:419401)

BONN-HE-79-1 PC **A03**/MF **A01**
Bonn Univ. (Germany, F.R.). Physikalisches Inst.
Photoproduction of Neutral Pions at Backward Angles in the Resonance Region and the eta-Cusp.
K. H. Althoff, M. Gies, O. Kaul, K. Koenigsmann, and D. Menze. Jan 79, 8p

U.S. Sales Only.

At the Bonn 2.5 GeV electron synchrotron we have measured the differential cross section of the reaction gamma p implies pi exp 0 p at a pion C.M. angle of 170 degrees and at photon energies Ksub(gamma) between 0.6 and 1.8 GeV. In comparison to previous measurements the accuracy of the data was improved substantially. For the first time in neutral pion photoproduction a cusp structure at the eta-threshold has been confirmed. (Atomindex citation 10:472061)

BONN-HE-79-2 PC **A02**/MF **A01**
Bonn Univ. (Germany, F.R.). Physikalisches Inst.
Photoproduction of Neutral Pions in the Region of the Fourth Nucleon Resonance.
K. H. Althoff, M. Gies, O. Kaul, K. Koenigsmann, and D. Menze. Feb 79, 5p
U.S. Sales Only.

We report the measurement of the differential cross section of the reaction gamma + p implies pi exp 0 + p at a photon energy of 1.4 GeV and pion c.m. angles between 60 and 175 degrees. The angular distribution confirms the simple quark model prediction of a pure magnetic excitation of the F sub 37 (1950) resonance. (Atomindex citation 10:472062)

BONN-HE-79-3 PC **A02**/MF **A01**
Bonn Univ. (Germany, F.R.). Physikalisches Inst.
Jet Invariant Mass in Quantum Chromodynamics.
L. Clavelli. Mar 79, 11p
U.S. Sales Only.

We give heuristic argument that a new class of observable related to the invariant mass of jets in e exp + e exp - annihilation is infrared finite to all orders of perturbation theory in Quantum Chromodynamics. We calculate the lowest order QCD predictions for the mass distribution as well as for the double differential cross section to produce back to back jets of invariant mass M sub 1 and M sub 2 . The resulting cross sections are quite different from that expected in simple hadronic fireball models and should provide experimentally accessible tests of QCD. (Atomindex citation 10:471990)

BONN-HE-79-4 PC **A02**/MF **A01**
Bonn Univ. (Germany, F.R.). Physikalisches inst.
Spin Structure of Hadronization Products.
L. Clavelli. Mar 79, 7p
U.S. Sales Only.

We point out that the hypothesis of soft hadronization together with Lorentz invariance strongly constrain the hadronization process ine exp + e exp - annihilation. A final stage jet hypothesis is made which satisfies these constraints. The resulting picture leads to testable predictions not obtainable from perturbative QCD. (Atomindex citation 10:471989)

CBPF-A0024/78 PC **A02**/MF **A01**
Centro Brasileiro de Pesquisas Fisicas, Rio de Janeiro.
Attempt to Analyze Spallation Yields with a Four-Parameter Formula.
J. B. Martins, V. di Napoli, O. A. P. Tavares, M. L. Terranova, and R. Portanova. Sep 78, 17p
U.S. Sales Only.

A semiempirical four-parameter formula, following the formalism of Gupta, is proposed in order to systematize spallation yields. A preliminary test made by comparing calculated and experimentally determined cross sections for 2-GeV bremsstrahlung-induced spallation in natural copper gave very encouraging results (a coefficient of reproducibility R = 1.7 or better). The formula will be used for an exhaustive study of intermediate- and high-energy photospallation of medium-weight nuclei. (Atomindex citation 10:443661)

CBPF-A0026/76 PC **A04**/MF **A01**
Centro Brasileiro de Pesquisas Fisicas, Rio de Janeiro.
Continuity of the Direct and Inverse Problems in One-Dimensional Scattering Theory and Numerical Solution of the Inverse Problem.
C. A. de Moura. Sep 76, 60p
U.S. Sales Only.

We propose an algorithm for computing the potential V(x) associated to the one-dimensional Schroedinger operator E identical to - d sub 2 /dx sub 2 + V(x) -infinite <x< infinite from knowledge of the S.matrix, more exactly, of one of the reelection coefficients. The convergence of the algorithm is guaranteed by the stability results obtained for both the direct and inverse problems. (Atomindex citation 10:438587)

CEA-N-2054 PC **A07**/MF **A01**
CEA Centre d'Etudes Nucleaires de Saclay, Gif-sur-Yvette (France). Dept. de Physique des Particules Elementaires.
DPHPE Activities During 1977.
Jun 78, 126p
In French.
U.S. Sales Only.

This annual report gives a short summary of experiments in progress and of approved proposals of experiments to be performed by the Elementary Particle Physics Department of Saclay, and also publication lists and information about the Department activities during 1977. (Atomindex citation 10:471194)

CEA-R-4892 PC **A09**/MF **A01**
CEA Centre d'Etudes de Limeil, 94 - Villeneuve-Saint-Georges (France).
Non-Linear and Stimulated Effects in Laser-Free Electrons Interaction.
These (D. es S.),
J. Kupersztych. Nov 77, 199p
In French.
U.S. Sales Only.

A new method of calculating interaction processes between free particles and the strong field of an arbitrary plane electromagnetic wave is presented. To construct the method, the electron behavior is examined by investigating the most general space-time symmetry properties of the field. The classical evolution operator is shown to describe both the evolution of the electron and the evolution of its spin in the external field. The quantum evolution operator allows one to define a representation well adapted to the calculation of scattering processes that occur in a laser beam. The nonrelativistic and ultra-relativistic limits of that representation are obtained by means of two unitary transformations which enable the Volkov states to be put exactly in two-component forms. The physical meaning of those transformations is shown to be connected to the motion of the electron spin (rigorously described by the Bargmann-Michel-Telegdi equation) and to the motion of its helicity in the wave. The method is used to calculate completely the relativistic cross-sections of the stimulated Bremsstrahlung and multiphoton inverse Bremsstrahlung processes. This last process is also investigated numerically and a saturation effect at high flux is exhibited. (Atomindex citation 09:392690)

CNRS-CPT-77-P-928 PC **A02**/MF **A01**
Centre Universitaire de Toulon (France).
Scattering Theory in Quantum Mechanics and Asymptotic Completeness.
J. M. Combes. Jul 77, 22p CONF-7706174-1
International conference on the mathematical problems in theoretical physics, Rome, Italy, 6 Jun 1977.
U.S. Sales Only.

A trial for describing the status of the scattering theory in quantum mechanics is given. The S matrix being defined, its unitarity is a consequence of the asymptotic completeness relation which is one of the mean problems discussed. It is shown that the multichannel scattering theory can be reformulated in the two Hilbert space formalism with a suitable choice of H sub 0 and J (one-body problem and N-body systems). Time-dependent methods try to solve directly the existence problem for wave-operators without recourse to resolvent methods. Emphasis is put on the fact that the success of such a method can be traced to its semi-classical aspect in the sense that the stationary phase method is a special way to single-out from the quantum dynamics the contribution of classical orbits. (Atomindex citation 09:412327)

CNRS-CPT-77-P-932 PC **A03**/MF **A01**
Centre National de la Recherche Scientifique, Marseille (France). Centre de Physique Theorique.
Mixing of Leptonic Number in a General SU(2)/ sub L/XU(1)XSU(2)/sub R/ Model.
P. Mery, 13 - Marseille Aix-Marseille-2 Univ., and Stephan Narison. Jul 77, 34p
U.S. Sales Only.

A general leptonic model based on the SU(2)sub(L)xU(1)xSU(2)sub(R) gauge group is discussed. General results for the l implies l' gamma and nu sub(l) implies nu sub(l') gamma processes are presented which can be used for any model based on the SU(2)sub(L)xU(1)xSU(2)sub(R) gauge group or on any of its subgroups. The predictions of the mu implies esup(gamma) branching ratio and of the neutrino life-time for various models discussed in the literature are reviewed. The main results are summarized in tables. (Atomindex citation 09:412402)

CNRS-CPT-77-P-943 PC **A02**/MF **A01**
Centre National de la Recherche Scientifique, Marseille (France). Centre de Physique Theorique.
Yang Mills Instantons, Geometrical Aspects.
R. Stora. Sep 77, 22p
U.S. Sales Only.

The word instanton has been coined by analogy with the word soliton. They both refer to solutions of elliptic non linear field equations with boundary conditions at infinity (of euclidean space time in the first case, euclidean space in the second case) lying on the set of classical vacua in such a way that stable topological properties emerge, susceptible to survive quantum effects, if those are small. Under this assumption, instantons are believed to be relevant to the description of tunnelling effects between classical vacua and signal some characteristics of the vacuum at the quantum level, whereas solitons should be associated with particles, i.e. discrete points in the mass spectrum. In one case the euclidean action is finite, in the other case, the energy is finite. From the mathematical point of view, the geometrical phenomena associated with the existence of solitons have forced physicists to learn rudiments of algebraic topology. The study of euclidean classical Yang Mills fields involves naturally mathematical items falling under the headings: differential geometry (fibre bundles, connections); differential topology (characteristic classes, index theory) and more recently algebraic geometry. These notes are divided as follows: a first section is devoted to a description of the physicist's views; a second section is devoted to the mathematician's vie. (Atomindex citation 09:412445)

CNRS-CPT-78-P-1003 PC **A02**/MF **A01**
Centre National de la Recherche Scientifique, Marseille (France). Centre de Physique Theorique.
Duality for Z(N) Gauge Theories.
C. P. Korthals Altes. Apr 78, 21p
U.S. Sales Only.

The duality properties of simple Z(N) gauge theories are discussed. For N<=4 we find self duality in four dimensions, and we give the transition points. For N>4 these systems are not self dual. Also the order parameter is discussed. The general Z(N) gauge theory is found to be self dual for all N. (Atomindex citation 10:471259)

CNRS-CPT-78-P-1009 PC **A02**/MF **A01**
Centre National de la Recherche Scientifique, Marseille (France). Centre de Physique Theorique.
Callan Symanzik beta (G) Function in Different Topological Sectors.
A. Rouet. 1978, 8p
U.S. Sales Only.

Using the formalism developed by Amati and the present author for constructing a perturbation theory around an instanton in gauge theories, it is proved that the Callan Symanzik beta (g) function is the same as in the perturbation theory developed around zero. (Atomindex citation 10:471294)

CNRS-CPT-78-P-1012 PC **A02**/MF **A01**
Centre National de la Recherche Scientifique, Marseille (France). Centre de Physique Theorique.
Glue Balls, Quarks, and the Pomeron-F.
J. W. Dash. Apr 78, 22p
U.S. Sales Only.

Three issues are presented related to s-channel unitarity which argue in favor of the p-f identity

model of diffraction of Chew, Rosenzweig, and Chan, and which argue against the traditional p+f model. These are (1) the violation of two component duality in modern p+f fits, (2) threshold effects due to strangeness, charm, and baryon production (flavoring), and (3) quark-loop renormalization of the QCD glueball, consistent with observed hadron multiplicities and dominant short range order. I also review p-f identity phenomenology. (Atomindex citation 10:471220)

CONF-791219-2 PC **A02**/MF **A01**
Georgia State Univ., Atlanta.
Neutron Emission in Deeply Inelastic and Fusion-Evaporation Reactions of 208-MeV exp 16 O with exp 93 Nb.
G. A. Petitt, R. L. Ferguson, and A. Gavron.
1979, 6p
Contract W-7405-ENG-26
International symposium on Continuum Spectra of Heavy Ion Reactors, San Antonio, TX, USA, 3 Dec 1979.

Neutrons emitted in coincidence with deeply inelastic fragments or with evaporation residues were measured in the 208-MeV exp 16 O on exp 93 Nb reaction. A significant fraction of the neutrons associated with deeply inelastic reactions and emitted in the forward direction cannot be attributed to evaporation from fully accelerated fragments, and must be due to nonequilibrium neutron emission mechanisms. Nonequilibrium neutron emission is considerably less important in the fusion reaction. 3 figures. (ERA citation 05:014496)

CONF-800114-1 PC **A03**/MF **A01**
Oak Ridge National Lab., TN.
Semi-Realistic Interactions for Scattering from Nuclei.
G. R. Satchler. 1980, 37p
Contract W-7405-ENG-26
Symposium on nuclear physics, Oaxtepec, Mexico, 3 Jan 1980.

It is of considerable interest to understand data from nucleon-nucleus and nucleus-nucleus scattering in terms of the individual nucleon motions and interactions, and to relate them in detail to other information. Work along these lines with a realistic interaction is reviewed under the following topics: the effective interaction, properties of the effective interaction, simplified effective interactions, density dependence of the interaction, applications to nucleon scattering, double folding for composite projectiles, applications to alpha particle scattering, and applications to heavy-ion scattering. Typical results are shown for exp 60 Ni + n, exp 60 Ni + p, alpha + exp 40 Ca, exp 16 O + exp 40 Ca, exp 40 Ca + exp 40 Ca, and exp 16 O + exp 28 Si. 17 figures, 1 table. (ERA citation 05:014512)

CONF-800114-2 PC **A03**/MF **A01**
Oak Ridge National Lab., TN.
Influence of Nuclear Structure on Heavy-Ion Fusion at Subbarrier Energies.
R. G. Stokstad. 1980, 37p
Contract W-7405-ENG-26
Symposium on nuclear physics, Oaxtepec, Mexico, 3 Jan 1980.

Measurements of the cross section for fusion of projectiles of exp 16 O and exp 40 Ar with isotopes of Sm were made at energies below the fusion barrier. The experimental identification of the evaporation residues proceeds through the off-line detection of x-rays from radioactive product nuclei. Large differences are observed in the thresholds for fusion with vibrational and rotational target nuclei. 18 figures. (ERA citation 05:014497)

COO-1545-268 PC **A02**/MF **A01**
Ohio State Univ., Columbus. Dept. of Physics.
Ghost Glueball and Pseudoscalar Mixing.
W. F. Palmer, and S. S. Pinsky. 1979, 5p
Contract EY-76-C-02-1545

Comments are made on some work of Rosenzweig, Schecter, and Trahern, who construct an effective Lagrangian for QCD involving a pseudoscalar ghost glueball field. It is pointed out that a successful description of pseudoscalar mixing written down some years ago indeed requires a pseudoscalar ghost. (ERA citation 05:012739)

DOE/CH/93026-1 PC **A02**/MF **A01**
National Academy of Sciences, Washington, DC.
Assessment of the Current Status of Basic Nuclear Data Compilations.
1979, 9p
Contract EY-76-C-02-2708-026

The Panel on Basic Nuclear Data Compilations met on April 6, 1979, to review the present status of nuclear data compilations. The following topics are addressed in this report: A-chain situation; ENSDF, Nuclear Structure Reference Files, and Recent References; Handbook of the Nuclides; and charged particle nuclear data. The panel made 13 recommendations, probably the most forceful being its recommendation against the use of data from unreferenced journals in ENSDF. 1 table. (ERA citation 05:014477)

DOE/ER/05096-T1 PC **A03**/MF **A01**
Rice Univ., Houston, TX. Bonner Nuclear Labs.
High Energy Physics. Progress Report, April 1, 1979-February 29, 1980.
G. C. Phillips, and J. B. Roberts. 1980, 27p
Contract AS05-76ER05096

Research is reported in these experiments: polarization in large angle n-p elastic scattering at 2, 3, and 6 GeV/c; depolarization in pp implies pN* at 6 GeV/c; A/sub nn/ in n-p elastic scattering at 6 GeV/c; A/sub nn/,A, and delta sigma/sub gamma / in p-p scattering from 1-12 GeV/c; delta sigma/ sub tau/ in p-n scattering from 1-2.5 GeV/c; and spin asymmetries in pp implies p pi exp + from 1-2 GeV/c. Three new experiments are described: asymmetries in inclusive pion production with a polarized beam and target; measurement of delta sigma/sub tau/ in p-d and p-p scattering from 1-2.5 GeV/c; and polarization asymmetries in pp-p pi exp + n from 1.2-2.0 GeV/c. (ERA citation 05:014462)

DOE/ER/05223-22 PC **A02**/MF **A01**
Texas A and M Univ., College Station. Dept. of Physics.
Intermediate-Energy Nuclear Theory. Progress Report, July 1, 1979-February 29, 1980.
R. A. Bryan, B. J. VerWest, and C. A. Dominguez. Nov 79, 11p
Contract AS05-76ER05223

Research during July 1, 1979 to February 29, 1980 was concentrated on improving the phase-shift analyses of NN scattering and studying strong interaction dynamics related to the NN interaction. The techniques for handling high partial waves and inelasticities in NN analyses were examined, along with a better representation of the reaction cross section data. Work continued on the partial-wave projection of theoretical pion production amplitudes for use in NN analyses. The task of reviewing the entire NN scattering data base with a careful review of the np data from 600 to 700 MeV was begun, along with initial analyses of that data. The work in strong interaction dynamics involved a determination of quark mass ratios and two independent determinations of the range of the pi NN vertex function. Work on a model for the Pseudophysical N anti N implies pi pi amplitudes was completed, and the initial formulation of a dynamical theory for isospin was done. (ERA citation 05:014471)

DOE/TIC-11017 PC **A02**/MF **A01**
Oak Ridge National Lab., TN.
Survey of Ground State Magnetic Dipole Strength.
D. J. Horen. 1979, 18p
Contract W-7405-ENG-26

The experimental status of ground-state magnetic dipole radiative strength is surveyed. Radiative transitions are tabulated for a large number of nuclei for which significant strength was observed. Fragmentary evidence tends to imply that the centroid of the GMDR might be independent of the nuclear mass number for A > 40, and lie at approx. 10 MeV. There still exists very little information on M1 strength in A > 40 nuclei. Status of the data in the lead region is reviewed. 42 references. (ERA citation 05:010884)

EFI-224(16)-77 PC **A02**/MF **A01**
Erevanskii Fizicheskii Inst. (USSR).
Radiation from a Uniformly Moving Charged Particle in a Nonlinear Uniaxial Crystal Placed in the Field of a Strong Electromagnetic Wave.
A. Ts. Amatuni, K. Z. Atsagortsyan, and S. S. Ehlbakyan. 1977, 16p
In Russian.
U.S. Sales Only.

The radiation from a charged uniformly moving relativistic particle in a nonlinear crystal placed in the field of a strong electromagnetic field is considered. The intensity of the radiation in X-ray band is shown to be dependent on the energy of particle in flight at the frequency of the external field in the X-ray band. (Atomindex citation 10:419372)

EFI-266(59)-77 PC **A02**/MF **A01**
Erevanskii Fizicheskii Inst. (USSR).
Possible Decay of a Short-Lived Neutral Particle.
N. A. Marutyan, F. A. Avetyan, and L. G. Sarkisova. 1977, 9p
In Russian.
U.S. Sales Only.

The search of a short-lived neutral particle (V exp 0 -shaped event) has been accomplished. The experiments are carried out using a nuclear emulsion irradiated by 200 GeV/c protons. The event detected is similar to a V exp 0 event by its characteristics. Invariant masses and neutral particle time-of-flight are calculated under various assumptions on the secondary particle nature. (Atomindex citation 10:478557)

HEDL-SA-1764 PC **A02**/MF **A01**
Hanford Engineering Development Lab., Richland, WA.
Exp 239 Pu Decay Heat Evaluation.
F. Schmittroth, and R. E. Schenter. Jan 79, 5p
CONF-790816-76
Contract EY-76-C-14-2170
International meeting on fast reactor safety technology, Seattle, WA, USA, 19 Aug 1979.

Based on recent measurements, a new evaluation for the decay heat from exp 239 Pu was obtained. The results are important for exp 239 Pu-fueled fast breeder reactors where decay heat values have previously been obtained from summation calculations. The evaluation was, in part, support for a revised ANS decay heat standard for light water reactors. The same statistical methods used previously in the evaluation of decay heat for the thermal fission of exp 235 U were used here. The new evaluation is typically a few percent higher than values previously calculated from ENDF/B-IV. Final evaluated uncertainties are approx. 4% (1sigma) and reflect discrepancies in the measurements that are shown to exist. 8 references. (ERA citation 05:012771)

HEDL-SA-1969-FP PC **A03**/MF **A01**
Hanford Engineering Development Lab., Richland, WA.
ENDF/B-5 Fission Product Cross Section Evaluations.
R. E. Schenter, and T. R. England. Dec 79, 33p
CONF-791223-3
Contract EY-76-C-14-2170
NEANDC specialist meeting on neutron cross sections of fission product nuclei, Bologna, Italy, 12 Dec 1979.

Cross section evaluations were made for the 196 fission product nuclides on the ENDF/B-5 data files. Most of the evaluations involve updating the capture cross sections of the important absorbers for fast and thermal reactor systems. This included updating thermal values, resonance integrals, resonance parameter sets, and fast capture cross sections. For the fast capture results generalized least-squares calculations were made with the computer code FERRET. Input for these cross section adjustments included nuclear models calculations and both integral and differential experimental data results. The differential cross sections and their uncertainties were obtained from the CSIRS library. Integral measurement results came from CFRMF and STEK Assemblies 500, 1000, 2000, 3000, 4000. Comparisons of these evaluations with recent capture measurements are shown. 15 figures, 10 tables. (ERA citation 05:012762)

HEPI-67-78 PC **A04**/MF **A01**
Akademiya Nauk Kazakhskoi SSR, Alma-Ata. Inst. Fiziki Vysokikh Energii.
Investigation of Inelastic Interactions of 400 GeV Protons with Emulsion Nuclei.
E. G. Boos, A. I. Borisenko, and A. N. Kazanskaya. 1978, 32p
U.S. Sales Only.

Proton-nucleus (pA) interactions registered in nuclear emulsion irradiated at the Batavian accelerator at 400 GeV/c are analyzed. Presented are energy dependences of some main parameters of hadron-nucleus (hA) interactions using experimental data on pA interactions for lesser energies. Quantitative and qualitative data comparison with predictions of a series of popular models of multiple particle production resulted from collisions with nuclei has been carried out. It is shown that most models can not explain all the experimental results. An analysis of the experimental data obtained permits the suggest in that the production mechanism in hA interactions has two- or multicomponent character. (Atomindex citation 10:472072)

HU-P-112 PC **A02**/MF **A01**
Helsinki Univ. (Finland). Dept. of Nuclear Physics.
Factorization in the Inclusive Reactions Pp Implies lambda +X exp ++ and K exp + p Implies lambda +X exp ++.
K. Alpgaard, A. G. Frodesen, and V. M. Hagman. 18 Mar 76, 13p
U.S. Sales Only.

A test of factorization is made using data on the inclusive reactions pp implies lambda +X exp ++ at 19 GeV/c and K exp + p implies lambda +X exp ++ at 16 GeV/c incident momentum. In these reactions lambda production occurs dominantly via proton fragmentation and, in addition, abantic is exotic in both cases. The comparison of the structure functions on the Chew-Low plot shows that the factorization hypothesis is satisfied at the approximately 10 % level when the momentum transfer from the proton to the lambda is less than 1 (GeV/c) exp 2 . (Atomindex citation 10:439701)

HU-P-141 PC **A02**/MF **A01**
Helsinki Univ. (Finland). Dept. of Nuclear Physics.
Invariant Cross Sections for Inclusive Reactions Anti Pp Implies pi exp + +X and Anti Pp Implies p+X at 22.4 GeV/C.
E. G. Boos, T. Temiraliev, and V. V. Samoilov. 23 Dec 77, 23p
U.S. Sales Only.

Invariant inclusive cross sections for pi exp + mesons and protons from antipp reactions at 22.4 GeV/c are presented. The average multiplicity for production of pi exp + mesons is 1.92+-0.02 and for protons 0.41+-0.02. Annihilation spectra have been approximated by using the difference between antipp and pp data. The resulting distributions have similar gross features as the total antipp data. (Atomindex citation 10:439721)

HU-P-161 PC **A02**/MF **A01**
Helsinki Univ. (Finland). Dept. of High Energy Physics.
Neutron Fragmentation in the Reaction Pn Implies pX at 19 GeV/C.
V. Bakken, H. Gennow, P. Lundborg, B. Selldén, and E. Sundell. Oct 78, 15p
U.S. Sales Only.

Data on the reaction pn implies pX are extracted from a pd experiment in the CERN 2m DBC at 19 GeV/c. The cross section for neutron fragmentation events with alpha t alpha < 1 (GeV/c) exp 2 is determined and compared with data at high energies at fixed Msub(x) exp 2 /s and t. We find that the cross section can be described with the triple-Regge formula taking into account only the pion exchange contributions i.e. pi pi P and pi pi R terms. A leading particle effect consistent with the pion exchange model is observed in the longitudinal momentum distribution of the negative pions in the final state of reaction pn implies pX, when transformed to the rest frame of the recoiling system X. (Atomindex citation 10:439706)

HU-TFT-78-24 PC **A02**/MF **A01**
Helsinki Univ. (Finland). Research Inst. for Theoretical Physics.
Reaction p+p Implies D+ pi exp + with a Polarized Beam and Target.
J. A. Niskanen. Jun 78, 16p
U.S. Sales Only.

Using the method of coupled channels to incorporate N delta intermediate states into the reaction p+p implies d+ pi exp + , we calculate the differential cross sections, when both the beam and the target are polarized. The results for yy-polarized initial state are given in some detail at 580 MeV. We propose the use of the differential cross section with initial longitudinal polarizations to investigate the D-state probability of the deuteron P/sub D/. This quantity is found to be very sensitive to P/sub D/. (Atomindex citation 10:443671)

HU-TFT-78-26 PC **A02**/MF **A01**
Helsinki Univ. (Finland). Research Inst. for Theoretical Physics.
Static Spherically Symmetric Solutions of the Classical Yang-Mills Equations.
P. Pirilae, and P. Presnajder. Jun 78, 13p
U.S. Sales Only.

All spherically symmetric solutions with time independent fields are found for the classical Yang-Mills equations with an extended charge in the case of SU(2) gauge group. There is a physically different solution corresponding to each choice of an arbitrary function of radius. In all solutions the energy and the charge are reduced compared to the Coulomb solution. For certain solutions the reduced charge and all fields outside the source vanish. (Atomindex citation 10:442321)

HU-TFT-78-27 PC **A02**/MF **A01**
Helsinki Univ. (Finland). Research Inst. for Theoretical Physics.
Proton Compton Scattering in Dispersion Relation Analysis.
O. Dumbrajs. 1978, 11p
U.S. Sales Only.

Inserting a logarithmically rising total photon-proton cross section into dispersion relation we update our theoretical knowledge about the forward real part. Taking into account analytic properties of the amplitude in the cosTHETA-variable we find that at low energies our experimental knowledge about this quantity should be modified. (Atomindex citation 10:443328)

HU-TFT-78-28 PC **A03**/MF **A01**
Helsinki Univ. (Finland). Research Inst. for Theoretical Physics.
Microscopic Model for the Pd Implies T pi exp +.
A. M. Green, and E. Maqueda. 1978, 44p
U.S. Sales Only.

A microscopic model for the pd implies t pi exp + reaction is constructed using two-body isobar wavefunctions containing the delta (1236). This model results in an analytical form for the reaction cross section and so it is possible to check the validity of those more approximate models that relate the pd implies t pi exp + cross section to the pp implies d pi exp + cross section. The calculations are performed at the three proton laboratory energies of 400, 470 and 600 MeV. (Atomindex citation 10:443641)

HU-TFT-78-29 PC **A02**/MF **A01**
Helsinki Univ. (Finland). Research Inst. for Theoretical Physics.
QCD Perturbative Predictions for the Signal of W exp +- Production in Hadronic Collisions.
M. Chaichian, and M. Hayashi. 1978, 10p
U.S. Sales Only.

Evidence for the intermediate bosons in high energy pp and antipp collisions as signal in the cross section of large psub(T) charged lepton pp, antipp implies W exp + -+X,W exp +- implies mu exp +- nu sub(mu) is considered for CM energy range sqrt s = 100-800 GeV. Besides the usual Dreil-Yan term which gives a very sharp peak in the lepton psub(T) distribution, the first order QCD contribution is included thus producing the intermediate boson with transverse momentum and smearing the lepton distribution. Scaling violation of the structure functions is incorporated and compared with the case when it is absent. (Atomindex citation 10:439597)

HU-TFT-78-44 PC **A02**/MF **A01**
Helsinki Univ. (Finland). Research Inst. for Theoretical Physics.
New Expression for the High-Energy Upper Bound on the Scattering Amplitude.
M. Chaichian, J. Fischer, S. M. Molodonsky, N. F. Nelipa, and I. Vrkoc. 1978, 20p
U.S. Sales Only.

The two Froissart-Martin high-energy upper bounds for forward and non-forward scattering are combined into one formula under the additional assumption that the scattering amplitude is polynomially bounded in energy for fixed scattering angles inside the Lehmann-Martin ellipse. The method used represents a modification of that of Kinoshita, Loeffel and Martin. The analogous bound for the scattering of particles with spin is obtained as well. Using the same method, a bound for the case of complex scattering angles is also derived and ways leading to its improvement by using the solution of the Dirichlet problem are suggested. (Atomindex citation 10:478420)

HU-TFT-79-15 PC **A02**/MF **A01**
Helsinki Univ. (Finland). Research Inst. for Theoretical Physics.
Are the Pseudoscalars Light Because of Hadron Self Energies.
N. A. Toernqvist. 1979, 8p
U.S. Sales Only.

Unitarity effects to the quark model S-wave q anti q states are discussed. Because of a spin counting factor unitarity effects should be much larger for the pseudosclars (P) than for the vector mesons (V) and could account for the V-P mass difference and the eta-eta' mixing. Contrary to QCD annihilation graphs the signs of the unitarity effects are in the right direction compared to experiment. (Atomindex citation 10:478503)

HU-TFT-79-16 PC **A02**/MF **A01**
Helsinki Univ. (Finland). Research Inst. for Theoretical Physics.
Dirac Field is a Gauge Transformation.
J. Mickelsson. 1979, 13p
U.S. Sales Only.

A form of the Dirac equation is given which leads to an interpretation of the Dirac field as a gauge transformation acting on the U(1) x SU(2) vector potentials Bsub(nu) of the weak and electromagnetic interactions. Transformation properties of the Dirac field under general coordinate transformations are briefly discussed. (Atomindex citation 10:478477)

IAE-2801 PC **A02**/MF **A01**
Gosudarstvennyi Komitet po Ispol'zovaniyu Atomnoi Energii SSSR, Moscow. Inst. Atomnoi Energii.
Search for Hard beta Radiation of exp 252 Cf Fission Fragments.
A. A. Borovoi, V. I. Kopeikin, L. A. Mikaelyan, and K. D. Shkol'nik. 1977, 8p
In Russian.
U.S. Sales Only.

Preliminary results of investigations of the hard (> 10 MeV) part of beta spectrum fragments of spontaneous exp 252 Cf fission are presented. Possible background sources in the measurements with a scintillation counter are discussed. The counter construction and criteria for event selection are described. Calibration measurements with different beta -sources are taken, and instrument characteristics are determined. It is shown that when the exp 252 Cf source intensity is 5x10 exp 4 fission/s, the number of beta -particles with the energy of E/sub beta / > 13 MeV does not surpass 10 exp -6 for one fission. (Atomindex citation 10:443718)

IC-77-115 PC **A02**/MF **A01**
International Centre for Theoretical Physics, Trieste (Italy).
Solitons and Supertranslations.
N. S. Baaklini. Oct 77, 9p
U.S. Sales Only.

The quantum theory for a two-dimensional supersymmetric theory is constructed around a supertranslated soliton solution. This is done by using Dirac's method for constrained systems. The fermionic parameter of supertranslation is treated as a collective co-ordinate. The path-integral expres-

sion is also obtained. (Atomindex citation 09:415124)

IC-77-122 PC **A02**/MF **A01**
International Centre for Theoretical Physics, Trieste (Italy).
Hidden Symmetry of the Two-Dimensional Chiral Fields.
A. M. Polyakov. Oct 77, 7p
U.S. Sales Only.

The non-abelian Goldstone boson (chiral field) interaction in two dimensions is examined. As was shown earlier, this theory strongly resembles the Yang-Mills theory in four dimensions. It is shown that dynamics of chiral fields is governed by the infinite number of the non-trivial conservation laws, which impose strong limitations on the S matrix. (Atomindex citation 09:415221)

IC-77-123 PC **A03**/MF **A01**
International Centre for Theoretical Physics, Trieste (Italy).
Linear Spin-Zero Quantum Fields in External Gravitational and Scalar Fields. Part 1. A One-Particle Structure for the Stationary.
B. S. Kay. Oct 77, 32p
U.S. Sales Only.

Mathematically rigorous results are given on the quantization of the covariant Klein-Gordon field with an external stationary scalar interaction in a stationary curved space-time. It is shown how, following Segal, Weinless etc., the problem reduces to finding a "one-particle structure" for the corresponding classical system. The main result is an existence theorem for such a one-particle structure for a precisely specified class of stationary space-times. Byproducts of our approach are (1)a discussion of when the equal-time hypersurfaces in a given stationary space-time are Cauchy; (2)a proof that when a one-particle structure exists it is unique a result of general interest for the quantization of linear systems; (3)a modification and extension of the methods of Chernoff (3) for proving the essential self-adjointness of ceratin partial differential operators. (Atomindex citation 09:415192)

IC-77-128 PC **A02**/MF **A01**
International Centre for Theoretical Physics, Trieste (Italy).
Symmetry Breaking Due to Quantum Fluctuations in Massless Field Theories.
P. Ghose, and A. Datta. Oct 77, 15p
U.S. Sales Only.

It is shown that quantum fluctuations can act as the driving mechanism for the spontaneous breakdown of both scale and the discrete phi implies - phi symmetries in a lamdaphi exp 4 theory which is massless and scale invariant in the tree approximation. Consequently dimensional transformation occurs and the dimensionless and only parameter lambda in the theory is fixed and replaced by the vacuum expectation value of the field. These results are shown to be consistent with the appropriate renormalization group equation for the theory. A scalar electrodynamics which is massless and scale invariant in the tree approximation is also considered, and it is shown that the Higgs meson in such a theory is much heavier than the vector meson for small values of the gauge coupling constant e. Another interesting consequence of such a theory is that it possesses vortex-line solutions only when quantum fluctuations are taken into account. (Atomindex citation 09:415172)

IC-77-129 PC **A02**/MF **A01**
International Centre for Theoretical Physics, Trieste (Italy).
Anomalies for Spinor Currents in a Massless Yang-Mills Theory.
H. Inagaki, and Y. Shimizu. Oct 77, 18p
U.S. Sales Only.

Anomalies of the divergences of the spinor currents in a supersymmetric gauge theory are studied in the perturbation theory. The linearly divergent nature of the loop integrations leads to the two kinds of anomalies. The divergent parts, which essentially give the vertex renormalization constant, contribute to the anomaly for the conformal spinor current, while the finite surface terms give rise to the anomaly for the first spinor current. The anomaly for the first current, however, can be removed by the redefinition of the gauge invariant conserved current. (Atomindex citation 09:415183)

IC-77-131 PC **A02**/MF **A01**
International Centre for Theoretical Physics, Trieste (Italy).
Anisotropic Superfluidity of Hadronic Matter.
J. Chela Flores. Oct 77, 25p
U.S. Sales Only.

From a model of strong interactions with important general features (f-g model) and from recent experiments of Rudnick and co-workers on thin films of helium II, hadronic matter is considered as a new manifestation of anisotropic superfluidity. in order to test the validity of the suggestion, some qualitative features of multiparticle production of hadrons are considered, and found to have a natural explanation. A prediction is made following a recent experiment on pi exp + p collisions. (Atomindex citation 09:415143)

IC-77-135 PC **A02**/MF **A01**
International Centre for Theoretical Physics, Trieste (Italy).
Thermal Properties of Gauge Fields and Quark Liberation.
A. M. Polyakov. Oct 77, 10p
U.S. Sales Only.

It is shown that at some temperature quark releasing occurs due to the string condensation. The properties of the arising phase are investigated. (Atomindex citation 09:415222)

IC-77-138 PC **A02**/MF **A01**
International Centre for Theoretical Physics, Trieste (Italy).
Quark-Antiquark Pairing Correlations and Superfluidity in Hadrons.
P. Ghose. Nov 77, 8p
U.S. Sales Only.

It is pointed out that scaling and quark confinement are suggestive of quark-antiquark pairing correlations within hadrons resulting in dynamical symmetry breaking and superfluid behaviour. (Atomindex citation 10:419910)

IC-77-149 PC **A02**/MF **A01**
International Centre for Theoretical Physics, Trieste (Italy).
Massless Scalar Field in Two Space-Time Dimensions and the Thirring Model.
L. K. Hadjiivanov, S. G. Mikhov, and D. T. Stoyanov. Dec 77, 21p
U.S. Sales Only.

In this paper a solution of the renormalized Thirring model constructed only from two scalar massless fields is studied. The representations of the conformal group for the solution as well as those for the scalar fields are obtained. It is proved that the renormalized Thirring equation is covariant with respect to the above representations. (Atomindex citation 10:419420)

IC-77-152 PC **A03**/MF **A01**
International Centre for Theoretical Physics, Trieste (Italy).
Informal Meeting on Recent Developments in Field Theory.
Dec 77, 44p CONF-771195-(Absts.)
Informal meeting on recent developments in field theory, Trieste, Italy, 21 Nov 1977.
U.S. Sales Only.

A topical meeting on recent developments in field theory was organized by the International Centre for Theoretical Physics from 21 to 23 November 1977. The publication is a compilation of the abstracts of lecture given. The mayor themes of the meeting were the problem of confinement, the quantization of Yang-Mills theories and the topological aspects of field theories in flat and curved spaces. (Atomindex citation 10:419374)

IC-77-154 PC **A03**/MF **A01**
International Centre for Theoretical Physics, Trieste (Italy).
Vacuum in Intensive Gauge Fields.
S. G. Matinian. Dec 77, 33p
U.S. Sales Only.

The behaviour of vacuum in a covariantly constant Yang-Mills field is considered. The expressions for the effective Lagrangian in an intensive field representing the asymptotic freedom of the theory are found. (Atomindex citation 10:419440)

IC-77-155 PC **A02**/MF **A01**
International Centre for Theoretical Physics, Trieste (Italy).
Pion Form Factor and Its Asymptotic Behaviour.
S. Dubnicka, A. Z. Dubnickova, and V. A. Meshcheryakov. Dec 77, 19p
U.S. Sales Only.

A simple phenomenological formula is constructed, consistent with the basic principles, providing a definite freedom in the choice of asymptotic behaviour and reflecting all experimentally known features of the pion form factor. The formula is used to test the asymptotic behaviour of the pion form factor both in spacelike and timelike region simultaneously. The present experimental data require the fall-off approximately 1/t exp 2 , which differs, from the quark model prediction. (Atomindex citation 10:419899)

IC-77-158 PC **A02**/MF **A01**
International Centre for Theoretical Physics, Trieste (Italy).
Conformal Spinors.
P. Budini. Dec 77, 10p
U.S. Sales Only.

It is shown that manifestly 0(4,2) covariant spinor field equations reduce, in Minkowski space, to two Dirac equations for two massless spinors, each of these being the inverse radius transform of the other. Since the two spinors have identical Lorentz and electromagnetic properties, while no transition between them is allowed in conformally invariant interactions, it is proposed that they may represent pairs of leptons like electron and muon. (Atomindex citation 09:415140)

IC-77-45 PC **A02**/MF **A01**
International Centre for Theoretical Physics, Trieste (Italy).
Quantum System Lifetimes and Measurement Perturbations.
E. Najakov. May 77, 20p
U.S. Sales Only.

The recently proposed description of quantum system decay in terms of repeated measurement perturbations is modified. The possibility of retarded reductions to a unique quantum state, due to ineffective localization of the decay products at initial time measurements, is simply taken into account. The exponential decay law is verified again. A modified equation giving the observed lifetime in terms of unperturbed quantum decay law, measurement frequency and reduction law is derived. It predicts deviations of the observed lifetime from the umperturbed one, together with a dependence on experimental procedures. The influence of different model unperturbed decay laws and reduction laws on this effect is studied. (Atomindex citation 10:438589)

IC-77-50 PC **A02**/MF **A01**
International Centre for Theoretical Physics, Trieste (Italy).
Generalized VMD Mechanism for Radiative Decays of C Anti C Mesons.
A. N. Mitra, S. Chakrabarty, and S. Sood. May 77, 9p
U.S. Sales Only.

A generalized VMD mechanism, implemented through the QCP model, is proposed for E1 and M1 decays of cantic mesons wherein the photon couples to two infinite sequences of radial excitations of exp 3 S sub 1 and exp 3 D sub 1 cantic states. The results reveal good accord with data under the conventional assignments, with a parameter signifying a reduced magnetic coupling of psi-ions with c quarks. (Atomindex citation 10:439660)

IC-77-84 PC **A02**/MF **A01**
International Centre for Theoretical Physics, Trieste (Italy).

Criterion for the Nuclearity of Spaces of Functions of Infinite Number of Variables.
I. M. Gali. Aug 77, 11p
U.S. Sales Only.

The paper formulates a new necessary and sufficient condition for the nuclearity of spaces of infinite number of variables, and defines new nuclear spaces which play an important role in the field of functional analysis and quantum field theory. Also the condition for nuclearity of the infinite weighted tensor product of nuclear spaces is given. (Atomindex citation 09:415167)

IC-78-11 PC **A02**/MF **A01**
International Centre for Theoretical Physics, Trieste (Italy).
Minimum Potential Strength for the Existence of Bound States.
B. G. Sidharth. Feb 78, 6p
U.S. Sales Only.

In this paper, after first showing that for everywhere attractive potentials, lambda U(r)(<=)o for all r, lambda>0, if U(r) falls off as fast as or faster than r exp -2 as r implies infinity, the radial Schroedinger equation does or does not have bound state solutions according to whether lambda>lambda sub 0 or lambda<lambda sub 0 , where lambdasub(deg)>0, an exact expression is derived for the minimum value lambdasub(deg) in terms of the potential only, for potentials U(r) such that rsup(m)U(r) implies 0 as r implies infinity for some m> 3. It is shown that in the process the work improves upon a result that can be deduced from Bargmann's inequality. (Atomindex citation 10:419473)

IC-78-14 PC **A02**/MF **A01**
International Centre for Theoretical Physics, Trieste (Italy).
Note on Total Muon Capture Rates in Heavy Nuclei.
R. Parthasarathy. Mar 78, 5p
U.S. Sales Only.

The results of calculations of the total capture rates in heavy nuclei, into account the nucleon velocity-dependent terms in the Fujii-Primakoff Hamiltonian and the effective mass of nucleons inside the nucleus, are presented along with the recent experimental data. The results are in general agreement with experiment. However, they indicate a possible deviation from SU(4) symmetry and, in some nuclei, support the Salam-Strathdee idea of the vanishing of the Cabibbo angle at large magnetic fields. . (Atomindex citation 10:420156)

IC-78-16 PC **A02**/MF **A01**
International Centre for Theoretical Physics, Trieste (Italy).
Weak Form Factors from Pion Electroproduction at Threshold a Phenomenological Approach.
G. Furlan, N. Paver, and C. Verzegnassi. Mar 78, 13p
U.S. Sales Only.

Data on pi exp + electroproduction at threshold are analyzed in order to obtain information on the form factors appearing in the longitudinal part. (Atomindex citation 10:419906)

IC-78-3 PC **A03**/MF **A01**
International Centre for Theoretical Physics, Trieste (Italy).
SU(3)XU(1) Theory of Weak-Electromagnetic Interactions with Charged Boson Mixing.
M. Singer. Jan 78, 34p
U.S. Sales Only.

An SU(3)xU(1) gauge theory of weak electromagnetic interactions is proposed in which the charged bosons mix with each other. The model naturally ensures e- mu and quark-lepton universality in couplings, and the charged boson mixing permits an equal number of leptons and quark flavours. There are no new stable leptons. All the fermions are placed in triplets and singlets and the theory is vector-like and hence free of anomalies. In addition one of the charged bosons can have a mass less than 43 GeV. Discrete symmetries and specific choices for Higgs fields are postulated to obtain the appropriate boson and fermion masses. Calculations for the decay of the tau particle, which is described as a heavy electron, are given. Multimuon events are discussed as are neutrino neutral currents. Calculations are also given for testing asymmetries in e-hadron scattering due to weak electron neutral currents along with other phenomenology of the model. (Atomindex citation 10:419474)

IC-78-4 PC **A04**/MF **A01**
International Centre for Theoretical Physics, Trieste (Italy).
Phase Transitions and Quark Confinement.
A. M. Polyakov, and E. Gava. Feb 78, 64p
U.S. Sales Only.

The publication collects six lectures on the following themes: quantum field theory and classical statistical mechanics, continuous symmetries, lattice gauge theories, the nature of confinement, a criterion for confinement and non-abelian Yang-Mills theories. (Atomindex citation 10:419461)

IC-78-5 PC **A03**/MF **A01**
International Centre for Theoretical Physics, Trieste (Italy).
Classical and Quantum Treatments of the Diffraction Problem in the Case of Non-Homogeneous Media.
A. B. Datzeff. Feb 78, 39p
U.S. Sales Only.

The diffraction of waves by an aperture is usually studied in the case of a homogeneous medium. In this paper, a method is proposed for the solution of the same problem in a medium of variable parameters (refractive index, external fields). It is successfully applied to diffraction of a classical scalar wave as well as of an electromagnetic vector wave and a Schroedinger wave, within the framework of this method, the scattering of particles may be considered as a particular case of the diffraction problem. Furthermore, the method is extended to cover the case of diffraction of dense electron beams. This has been achieved by means of a non-linear integro-differential equation, proposed by the author as a generalization of the well-known linear Schroedinger equation. A decisive experiment could be made which, besides showing whether the solution thus obtained is true, would also speak in favour of one of the two equations mentioned above. The latter is pertinent to the discussion of the physical essence of Quantum Mechanics. (Atomindex citation 10:419399)

IC-78-7 PC **A02**/MF **A01**
International Centre for Theoretical Physics, Trieste (Italy).
Phase Shifts for Certain Classes of Potentials.
B. G. Sidharth. Feb 78, 11p
U.S. Sales Only.

In this paper, using recurrence relations for the spherical Bessel functions, recurrence relations for the higher order phase shifts deltasub(l) of three wide classes of potentials are deduced: U(r)=+-rsup(-)sup(m).f(r) where f(r)>M >0 for all r, M being any fixed number, U(r)=+-f(r).exp(-cr exp 2), for a wide class of functions f(r) described in the text, these including potentials like rsup(+-)sup(m).exp(-cr exp 2) and finite range potentials, U(r)=+-rsup(+)sup(m).f(r), 0<P<f(r)<Q, P and Q being any fixed numbers, for r(<=)a, U(r)=0 for r>a. The consequences of these relations are then briefly examined, one of these being that for these three classes of potentials, deltasub(l)sub(-t) alpha deltasub(l) implies 1, implies mu l and implies mu l exp 2 respectively as l implies infinity. (Atomindex citation 10:419472)

IC-78-8 PC **A02**/MF **A01**
International Centre for Theoretical Physics, Trieste (Italy).
Investigation of the Charge Exchange Process pi exp - D implies pi exp 0 Nn.
Feb 78, 8p
U.S. Sales Only.

The transition rate has been calculated for the charge exchange of stopped pi exp - in the deuteron. The present result is h omega (pi exp - d implies pi exp 0 nn)=0.695x10 exp -4 eV. Making use of the value h omega (pi exp - d implies nn)=0.682 eV, which was previously obtained, the branching ratio omega (pi exp - d implies pi exp 0 nn) alpha omega (pi exp - d implies nn)=1.02x10 exp -4 has been estimated. (Atomindex citation 10:419914)

IC-78-9 PC **A02**/MF **A01**
International Centre for Theoretical Physics, Trieste (Italy).
Effect of Electromagnetic Structure of Heavy Ions Below the Coulomb Barrier.
V. J. Menon, C. Maheshwari, and D. C. Agrawal. Feb 78, 15p
U.S. Sales Only.

The scattering of two charged bodies (such as heavy ions)at energies below the Coulomb barrier is considered. By solving the radial Schroedinger equation in a simple model it is found that the phase shifts are indeed close to those due to point charges, and the cross-section is very well reproduced by the Rutherford formula. The first-order Born approximation, however, differs violently from the corresponding Born amplitude due to point charges, and achievement of the Rutherford limit in the momentum space is a difficult task. A method of summing up the Born series is indicated and its evaluation in the semiclassical limit is suggested. (Atomindex citation 10:419444)

IFVE-ONF-78-23 PC **A02**/MF **A01**
Gosudarstvennyi Komitet po Ispol'zovaniyu Atomnoi Energii SSSR, Serpukhov. Inst. Fiziki Vysokikh Energii.
Total Cross Sections for Neutrino and Antineutrino Interactions in the 3-30 GeV Energy Range.
A. P. Bugorskii, A. S. Vovenko, and A. A. Volkov. 1978, 11p
In Russian.
U.S. Sales Only.

Results of investigations into total cross sections for neutrino and antineutrino interactions over charged currents with a muon in the final state in the energy range of 3-30 GeV are presented. Experiments have been performed in the accelerator beam of the Institute of High Energy Physics using a neutron detector with iron filters. Neutrino and antineutrino spectra have been obtained, as well as the muon distributions over the impulse and angle for neutrino and antineutrino interactions. Taking into account the amendments, connected with the muon registration threshold, the detector angular efficiency and the neutrino penetration into a neutrino beam, mean inclines of total cross sections are determined out of the total number of registered events in the assumption of the linear growth with the energy: asub(nu)=(sigmasub(t)(nu))/epsilon sub(nu) = (0.74+-0.07)x10 exp -38 cm exp 2 xGeV exp -1 ; asub(anti nu)=(sigmasub(t)(anti nu))/epsilonsub(anti nu)=(0.31-+0.03)x10 exp -38 cm exp 2 xGeV exp -1 . The total cross section ratio is: R=sigmasub(anti nu)/sigmasub(nu)=0.42-+0.03. (Atomindex citation 10:443471)

IFVE-ONF-78-78 PC **A02**/MF **A01**
Gosudarstvennyi Komitet po Ispol'zovaniyu Atomnoi Energii SSSR, Serpukhov. Inst. Fiziki Vysokikh Energii.
Mu exp - E exp + Pair Production in SKAT Neutrino Experiment.
D. S. Baranov, A. A. Ivanilov, and V. I. Konyushko. 1978, 13p
U.S. Sales Only.

The results on search for mu exp - e exp + production in nu sub(mu)N interactions up to 30 GeV are presented. The ratio N(nu sub(mu)N implies mu exp - e exp + + hadrons)/N(nu sub(mu)N implies mu exp - + hadrons)=(0.7+-0.4)% has been obtained. Two detected events can be interpreted as production of heavy neutral lepton with the mass of 1.4<=m(M deg) <= 2.4 GeV/c exp 2 with further leptonic decay. Lifetime is estimated to be tau(M deg) approximately equal to (1-5)x10 exp -12 s. The third event is considered a semileptonic decay of a charmed baryon. (Atomindex citation 10:439709)

IFVE-OTF/PPK-76-63 PC **A03**/MF **A01**
Gosudarstvennyi Komitet po Ispol'zovaniyu Atomnoi Energii SSSR, Serpukhov. Inst. Fiziki Vysokikh Energii.

Production of Direct Leptons in Hadron-Hadron Collisions in Quark Parton Picture of Interaction.
A. K. Likhoded, Yu. P. Nikitin, and G. G. Volkov. 1976, 27p
U.S. Sales Only.

A detailed analysis of the mechanism for lepton "direct" production in pN collisions has been carried out in terms of multiquark interaction pictures. An attempt has been made to bring into agreement the existing experimental information on direct leptons in hadron collisions, on neutrino interactions with matter, and on observation of noncolinear leptonic pairs in electron-positron beams using new (V+A) currents both for leptons and quarks. (Atomindex citation 10:419922)

IFVE-OTF-77-74 PC **A02**/MF **A01**
Gosudarstvennyi Komitet po Ispol'zovaniyu Atomnoi Energii SSSR, Serpukhov. Inst. Fiziki Vysokikh Energii.
D Meson Relative Yield in Hadronic Collisions.
V. G. Kartvelishvili, and A. K. Likhoded. 1977, 7p
In Russian.
U.S. Sales Only.

The smallness of the c quark "sea" in usual hadrons results in the necessity to consider double-gluon production of charm. In the case of D mesons it corresponds to the production of small invariant masses of the DD pair and dominance of two first partial waves of c anti c quarks. The smallness of interaction, that leads to hyperfine spallation of D-D * results in the fact that the cross section for D * production is considerably larger than that for D, i.e. sigma (D * anti D *) > > sigma. (Atomindex citation 10:419918)

IFVE-OTF-77-89 PC **A02**/MF **A01**
Gosudarstvennyi Komitet po Ispol'zovaniyu Atomnoi Energii SSSR, Serpukhov. Inst. Fiziki Vysokikh Energii.
Mixing of Leptons with Various Quantum Numbers in Gauge Schemes of Weak and Electromagnetic Interactions.
A. G. Liparteliani, V. A. Monich, Yu. P. Nikitin, and G. G. Volkov. 1977, 16p
U.S. Sales Only.

Gauge schemes of weak and electromagnetic interactions have been considered. The schemes contain mixing angles of leptons with electron and muon quantum numbers. Some of evidence for mu -e mixing has also been considered. (Atomindex citation 10:419923)

IFVE-OTF-78-125 PC **A03**/MF **A01**
Gosudarstvennyi Komitet po Ispol'zovaniyu Atomnoi Energii SSSR, Serpukhov. Inst. Fiziki Vysokikh Energii.
Theory of Relativistic Direct Interaction.
S. N. Sokolov. 1978, 39p
U.S. Sales Only.

Report discusses the structure, the generality and the physical meaning of the relativistic Hamiltonian theory (RHT) as a whole, starting from its most general quantum-field version and finishing with its classical counterpart. It is shown, in particular, that in the absence of bound states any relativistic invariant S-matrix can be obtained in the framework of the RHT. The properties of causality and locality of RHT are discussed, and two mechanisms of interaction transfer are considered. The space-time interaction of the motion of particles inside the direct interaction range is formulated and shown to be non-unique. (Atomindex citation 10:477677)

IFVE-OTF-78-44 PC **A02**/MF **A01**
Gosudarstvennyi Komitet po Ispol'zovaniyu Atomnoi Energii SSSR, Serpukhov. Inst. Fiziki Vysokikh Energii.
Spontaneous Breaking of CP-Symmetry in a Nonstationary Isotropic Metric.
A. A. Grib, V. M. Mostepanenko, and V. M. Frolov. 1978, 15p
In Russian.
U.S. Sales Only.

Studied is the breaking effect of P- and CP-symmetries, arising in the interaction of a massless scalar field and a massive fermion field. The Li model is generalized in the case of the open-type homogeneous isotropic metric. The operator type of P-reflection in the Lobachevsky space is determined. The separation of variables in a general-covariant generalization of the Dirac equation which contains an additional member, taking into account spontaneous symmetry breaking for a pseudoscalar field. To describe the effects quantitatively, the fermion field is subjected to the secondary quantization, and its hamiltonian is described. With the aid of diagonalization of the hamiltonian by the Bogolyubov transformations the formulas are obtained for the density of produced pairs, density of chiral charge and pseudoscalar density of fermions. (Atomindex citation 10:442270)

IFVE-PPK-77-45 PC **A02**/MF **A01**
Gosudarstvennyi Komitet po Ispol'zovaniyu Atomnoi Energii SSSR, Serpukhov. Inst. Fiziki Vysokikh Energii.
Two-Pion Correlations in Ksup(+)P Interactions at 32 GeV/C.
I. V. Azhinenko, G. Blyumenfel'd, and F. Verber. 1977, 14p
In Russian.
U.S. Sales Only.

Two-particle correlations on rapidities between pi exp - -mesons are studied experimentally in Ksup(+)p interactions at 32 GeV/C. The existence of considerable positive correlations during clusterization of pi exp - mesons in the rapidity ranges y sub 1 =y sub 2 =0 and y sub 1 --y sub 2 approximately -0.8 is demonstrated. Positive correlations also manifest themselves in semiinclusive reactions where the correlation function for delta y approximately 0 depends weakly on the event topology, varies slightly with the increase of energy and differs substantially from correlations between pions of different signs. (Atomindex citation 09:413353)

IFVE-STF-74-46 PC **A02**/MF **A01**
Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Serpukhov. Inst. Fiziki Vysokikh Ehnergij.
Interwinning Operators for Semisimple Lie Groups.
A. N. Leznov, and M. V. Savel'ev. 1974, 11p
In Russian.
U.S. Sales Only.

The unified expressions for interwining operators of the complex semisimple Lie groups and those of their real forms, whose rank equals real rank, has been obtained in the terms of invariant root technique, using universal parametrization and the method worked out earlier for construction of non-compact semisimple Lie operator-irreducible representations. The obtained expressions apparently carry a mutual character which is confirmed by the considered example of U(p,q) group. The received expressions are products of operator-functions, that correspond to rank 1 subgroups, and contain complete information about analytic properties of interwinning operators in weight-space (in maximal compact subgroup generator basis) and, about all complete irreducible representation and their pseudo-unitary components. (Atomindex citation 09:415202)

IHES-P-76-153 PC **A02**/MF **A01**
Institut des Hautes Etudes Scientifiques, Bures-sur-Yvette (France).
Asymptotic Estimates in Perturbation Theory with Fermions.
G. Parisi. Dec 76, 7p
U.S. Sales Only.

The nth order of perturbation theory is asymptotically estimated for a Yukawa interaction among fermions. The results are rather different from the scalar case. Quite recently Lipatov has discovered that the nth order of the perturbative expansion can be asymptotically estimated in the case of interacting bosons. A trial for extending these results to interacting fermions is presented. The techniques used are not a straightforward generalization of Lipatov's ones; a system of many bosons at high density may be in a coherent state and be described by a c-number classical field: however, the Pauli indetermination principle forbids the construction of a coherent state of fermions: the high density limit of nonrelativistic fermions is described by the Thomas-Fermi equation. Indeed the procedure which is followed to obtain the estimates can be regarded as a generalization of the Thomas-Fermi equation to the relativistic case. (Atomindex citation 10:468376)

INIS-mf-4076 PC **A02**/MF **A01**
Science Research Council, London (UK).
Annual Report of the Particle Physics Committee.
1977, 13p
U.S. Sales Only.

The Annual Report for the period 1 August 1975 to 31 July 1976 of the Particle Physics Committee of the Nuclear Physics Board, under the (United Kingdom) Science Research Council, is presented. Details are given of particle physics grants and laboratory agreements. (Atomindex citation 09:361850)

INIS-mf-4380 PC **A04**/MF **A01**
Science Research Council, Daresbury (England). Daresbury Lab.
Daresbury 1977.
1978, 68p
U.S. Sales Only.

The program of the Daresbury Laboratory is described. Sections on nuclear structure (the building of the Nuclear Structure Facility (NSF), tandem construction, experimental physics, nuclear theory), synchrotron radiation (the synchrotron Radiation Sourse (SRS) and its use in atomic, molecular and solid state physics and X-ray Studies) high energy physics (the NINA and CERN programmes and the closure of the electron synchrotron) and computer systems are included. (Atomindex citation 09:398790)

INIS-mf-4511 PC **A02**/MF **A01**
Brussels Univ. (Belgium). Faculte des Sciences.
Dynamical and Topological Considerations on Quark Confinement.
F. Englert, and P. Windey. 1978. 13p CONF-780364-1
Les Houches school on solitons, instantons, turbulence, Les Houches, France, Mar 1978.
U.S. Sales Only.

Non abelian magnetic superconductivity provides a realization of the topological algebra of 't Hooft which does confine quarks. Its dynamical and topological aspects are discussed and the related phenomenological theory of quark confinement is sketched. (Atomindex citation 10:419901)

INP-887/PH PC **A02**/MF **A01**
Institute of Physics and Nuclear Techniques, Krakow (Poland).
Dependance of the "Normalized Multiplicity" of Particles Produced in Proton-Nucleus Interactions on the Primary Energy.
J. Babecki. 1975, 11p
U.S. Sales Only.

The mean "normalized multiplicities" of particles produced in p-nucleus interactions: with the leading particles (R sub 1) and without them (R sub 2) were calculated from the emulsion data. The independence of R sub 2 of the primary energy E sub 0 were stated in very wide interval of E sub 0 from 6.2 to thousands of GeV. R sub 2 is approximately equal to the mean number of collisions of the primary particle in the nucleus. (Atomindex citation 10:443453)

INP-951/PH PC **A02**/MF **A01**
Institute of Nuclear Physics, Krakow (Poland).
Relation Between the Glauber Model and Classical Probability Calculus.
A. Bialas, M. Bleszynski, and W. Czyz. 1977, 10p
U.S. Sales Only.

It is shown that the Glauber model, for factorized ground state densities and purely imaginary elastic amplitudes, can be viewed as a consequence of the classical probability calculus used for computing incoherent cross-sections, supplemented with the optical theorem to obtain the coherent effects. (Atomindex citation 10:471976)

INP-952/PH PC **A02**/MF **A01**
Institute of Nuclear Physics, Krakow (Poland).

Effects of Nucleon-Nucleon Correlations in the Multiplicity Distributions of Particles Produced in Hadron-Nucleus Collisions.
E. Bleszynski, M. Bleszynski, and W. Czyz. 1977, 18p
U.S. Sales Only.

It is shown that if one takes into account the nucleon-nucleon short range correlations in the target nucleus and the impact parameter distribution of the elementary production processes, the average multiplicities and multiplicity dispersions decrease by approximately 10% for light and approximately 5% for heavy nuclei. (Atomindex citation 10:471978)

INP-977/PH PC **A03**/MF **A01**
Institute of Nuclear Physics, Krakow (Poland).
Possibility of Universal Description of Angular Distribution in Interactions of Hadrons with Nuclei.
B. Furmanska, R. Holynski, S. Krzywdzinski, and W. Wolter. Aug 77, 25p
U.S. Sales Only.

The validity of the hypothesis that the angular distribution of shower particles produced in hadron - nucleus interactions can be parametrized by the number of slow particles emitted from the struck nucleus is tested. A relation between the mean number of slow particles and the mass number A of the target nucleus or the corresponding average number of collisions inside the target nucleus is found. (Atomindex citation 10:472079)

ITEF-30(1978) PC **A02**/MF **A01**
Gosudarstvennyi Komitet po Ispol'zovaniyu Atomnoi Energii SSSR, Moscow. Inst. Teoreticheskoi i Eksperimental'noi Fiziki.
Intermediate Production of d-/Ita exp - Isobar in the pi exp 0 and eta Mesons Production Reaction by 3.2 GeV/C pi exp - Mesons on Xe Nucleus.
N. N. Shishov. 1978, 10p
In Russian.
U.S. Sales Only.

An attempt is taken to evaluate the cross sections for intermediate production of delta exp - isobar in the pi exp - + n(A) implies pi exp 0 (eta) + delta exp - + A' reactions on a Xe nucleus. The values of upper cross section limits equal to (965 -+ 229) mu b for the reaction with pi exp 0 -mesons and (116 -+ 37) mu b for the reaction with eta-mesons are obtained. (Atomindex citation 10:443780)

ITEF-40(1978) PC **A04**/MF **A01**
Gosudarstvennyi Komitet po Ispol'zovaniyu Atomnoi Energii SSSR, Moscow. Inst. Teoreticheskoi i Eksperimental'noi Fiziki.
Higher Orders of the Perturbation Theory and Summation of Series in the Quantum Mechanics and Field Theory.
V. S. Popov, V. L. Eletskii, and A. V. Turbiner. 1978, 64p
In Russian.
U.S. Sales Only.

Considered is the Borel method for summation of series of the perturbation theory with factorially growing coefficients: asub(k) = or approximately (ksub(a) asup(k)ksup(beta) at k implies infinity, connection is established between asymptotics of asub(k) coefficients of this series and peculiarity character of its sum f(g) = sigma asub(k)(-g)sup(k) in the point g=0. An improved perturbation theory is suggested and the range of its applicance is found. The use of the improved perturbation theory permits a precise solution f(g) to be found a certain interval g based on the few first coefficients asub(k) and their asymptotics at k implies infinity. The results are tested on a number of physical problems, for which perturbation theory series coefficients have factorial growth and simultaneously precise solutions are known (analytically or numerically). Improved perturbation theory application to the g PHIsup(4permits determination his range is that a monotonously growing function. (Atomindex citation 10:442325)

ITEP-110(1977) PC **A02**/MF **A01**
Gosudarstvennyi Komitet po Ispol'zovaniyu Atomnoi Energii SSSR, Moscow. Inst. Teoreticheskoi i Eksperimental'noi Fiziki.
Observation of New lambda Anti lambda States.
O. N. Baloshin, B. P. Barkov, and B. V. Bolonkin. 1977, 18p
U.S. Sales Only.

lambda anti lambda system produced in the pi exp - p interaction at incident pion momentum 40 GeV/c is investigated. The bump with M(lambda anti lambda)=3430 MeV/c exp 2 , GITA approximately 40 NeV/c exp 2 , is observed in the mass spectrum of lambda anti lambda system. The angular distribution of lambda anti lambda in this region does not contradict Jsup(PC)=2. The spin state and spherical harmonic momenta analysis in the mass range of 2.23-3.0 GeV/c exp 2 gives strong indications on the existence three states with the masses of 2400+-40 MeV/c exp 2 , 2510+-25 MeV/c exp 2 , 2820+-40 MeV/c exp 2 and the widths of 65+-50 MeV/c exp 2 , 124+-53 MeV/c exp 2 , 132+-80 MeV/c exp 2 . The preferred quantum numbers of these states (Jsup(PC)) are 3 exp +- , 2 exp ++ and 4 exp ++ , respectively. (Atomindex citation 10:443456)

ITEP-118(1978) PC **A03**/MF **A01**
Gosudarstvennyi Komitet po Ispol'zovaniyu Atomnii Energii SSSR, Moscow. Inst. Teoreticheskoi i Eksperimental'noi Fiziki.
Dispersion-Like Treatment of a Three-Particle Spectrum.
I. L. Grach, M. Zh. Shmaticov, and Yu. A. Simonov. 1978, 39p
U.S. Sales Only.

General description of the three-particle spectrum with its two main properties - the Thomas theorem and the Efimov effect is given. The spectrum of levels generated by only two-particle (particle + pair bound state) contributions to the unitarity condition is shown to have none of these properties. With the account of the three-particle intermediate states in the unitarity condition the N/D equations reproduce both the Thomas theorem and the Efimov effect. The quantitative calculation of a three-particle spectrum by means of N/D equations, making use of only on-shell characteristics of the two-particle system, is in reasonable agreement with the solution of the Faddeev equation. (Atomindex citation 10:474455)

ITEP-127(1978) PC **A02**/MF **A01**
Gosudarstvennyi Komitet po Ispol'zovaniyu Atomnoi Energii SSSR, Moscow. Inst. Teoreticheskoi i Eksperimental'noi Fiziki.
Stability of Time-Dependent Particle-Like Solutions of Some Wave Equations.
N. A. Voronov. 1978, 14p
U.S. Sales Only.

The proof of the nonstability of the one-dimensional periodical localized solutions of the equation with a spontaneously broken symmetry is given. The stability of the one-dimensional oscillating solutions of the sine-Gordon equation was also considered with regard to such perturbations. As it was expected these solutions proved to be stable. (Atomindex citation 10:474537)

ITEP-16(1979) PC **A03**/MF **A01**
Gosudarstvennyi Komitet po Ispol'zovaniyu Atomnoi Energii SSSR, Moscow. Inst. Teoreticheskoi i Eksperimental'noi Fiziki.
Light-Front Wave Function of Composite System with Spin.
V. A. Karmanov. 1979, 36p
U.S. Sales Only.

The method to construct the relativistic wave function with spin on the light front is developed. The spin structure of the deuteron wave function in relativistic range is found. The calculation methods are illustrated by the calculation of elastic pd-scattering cross section. The consideration carried out is equivalent to the solution of the problem of taking into account the spins and angular momenta in the parton wave functions in the infinite momentum frame. (Atomindex citation 10:477634)

ITEP-27(1979) PC **A03**/MF **A01**
Gosudarstvennyi Komitet po Ispol'zovaniyu Atomnoi Energii SSSR, Moscow. Inst. Teoreticheskoi i Eksperimental'noi Fiziki.
Formulation of Two- and Three-Body Relativistic Equations Explaining Light-Front Dynamics.
B. L. Bakker, L. A. Kondratyuk, and M. V. Terent'ev. 1979, 39p
U.S. Sales Only.

Using the light-front hamiltonian with two-body forces a consistent set of three-dimensional two- and three-body relativistic equations is derived. The structure of two-body equations is fixed by the restrictions imposed on the pairing interaction operator to be dependent only on internal variables and to satisfy the angular condition. It is shown that imposing the separability and angular conditions allows one to uniquely express the three-body mass operator through the two-body mass operators. The kernel of the equation for two-body scattering amplitude in three-body space is uniquely related to the two-body interaction operator but is not equal to the latter identically. The hamiltonian formalism developed in this paper to consider the systems with a fixed number of particles in relativistic range can be applied for the description of relativistic effects in nuclei. (Atomindex citation 10:477578)

ITEP-50(1977) PC **A02**/MF **A01**
Gosudarstvennyi Komitet po Ispol'zovaniyu Atomnoi Energii SSSR, Moscow. Inst. Teoreticheskoi i Eksperimental'noi Fiziki.
Protons and pi exp - Generation at 188 Mrad in Proton-Nucleus Interaction for 9 GeV/C.
Yu. E. Belikov, A. E. Bukley, and V. B. Gavrilov. 1977, 15p
U.S. Sales Only.

The cross-sections of inclusive proton and negative pion production by 9 GeV/c protons on Be, Al, Cu and Au nuclei at the laboratory angle of 188 mrad have been measured. Invariant function F(x, psub(t))=E/p exp 2 xddelta/dpd omega (here x- the Feynman variable, psub(t)-transverse momentum) having been compared with the higher energy data was found to be independent of the primary momentum at psub(o) > or approximately 9 GeV/c with the accuracy of about 15% (that is the accuracy of the cross-sections absolute normalization) both for secondary protons and pions. Both ratio R=rhosub(A)/rhosub(Be) (where rhosub(A)=1/deltasub(PA)sup(in) Fsub(A)(x,psub(t), A=Al, Cu, Au) and R=rhosub(A)/rhosub(Al) (A=Cu, Au-for reaction pA implies p increase with x growth at the fixed laboratory production angle and are the most sharp at the largest x. R=rhosub(cu)/rhosub(Be) ratio for pA implies pi exp - reaction increases with psub(t) rise at x fixed for 0.3 < x > 0.6. The experimental data are discussed within the framework of the multiple rescattering picture. (Atomindex citation 10:443461)

ITEP-56(1977) PC **A02**/MF **A01**
Gosudarstvennyi Komitet po Ispol'zovaniyu Atomnoi Energii SSSR, Moscow. Inst. Teoreticheskoi i Eksperimental'noi Fiziki.
A-Dependence of Differential Multiplicity at 7 GeV/C.
A. V. Arefyev, Yu. D. Bayukov, and V. I. Efremenko. 1977, 22p
U.S. Sales Only.

Particle production in the inelastic proton-nucleus interactions have been investigated at the initial momentum psub(0)=7 GeV/c for Be, Al, C, Cu, Cd and Pb nuclei. A-dependences of both pi exp - and p differential multiplicities are parametrized as < nsub(i) > approximately Asup(alpha (sub(i))). Similar parametrization seems to be also suitable for the normalized topological cross-section Wsup(n-)(A) of the processes with nsup(-) forward emitted negative pions. The dependence of alpha sub(i) on the secondary particle type and its kinematic region for < nsub(i) > (A) and on n exp - for Wsup(n-)(A) has been obtained. These experimental data indicate to secondary interactions of the produced particles inside nucleus. The total multiplicity distribution is observed to obey KNO scaling. (Atomindex citation 10:443448)

ITF-77-70R PC **A02**/MF **A01**
AN Ukrainskoj SSR, Kiev. Inst. Teoreticheskoj Fiziki.
Physical Consequencies of the Finiteness of Number of Amplitude Zeroes.
Yu. M. Lomsadze, and V. I. Kelemen. 1977, 17p
In Russian.
U.S. Sales Only.

Proceeding from an analysis of experimental data and results of axiomatic quantum field theory num-

bers of zeroes of the elastic forward pi exp + p scattering amplitudes in the complex energy plane beyond cuts are established. This permits a series of physical corollaries to be obtained; dispersion relations for the inverse amplitude and conditional asymptotical lower and upper bounds for certain combinations of the total pi N scattering cross-sections and the differential cross-sections of the forward pi N scattering. (Atomindex citation 09:392699)

ITF-77-84-R PC **A03**/MF **A01**
Akademiya Nauk URSR, Kiev. Inst. Teoreticheskoi Fiziki.
Diffraction Hadron Interaction with Few-Nucleon Nuclei.
V. K. Tartakovskii, M. A. Khassan, and I. S. Dotsenko. 1977, 41p
In Russian.
U.S. Sales Only.

It is shown that the experimental data on the interaction of hadrons (with the energy of tens of Gev) with protons and deuterons can be described in the diffractional approximation. The data on hadron-neutron interaction being obtained, the cross-sections of the different high-energy hadron interaction processes with d,T, exp 3 He nuclei are calculated. In some cases these cross sections appear to be rather sensitive to the structure of few-nucleon nuclei and multiple scattering processes. (Atomindex citation 10:420093)

JCU/NP-48 PC **A02**/MF **A01**
James Cook Univ. of North Queensland, Townsville (Australia). Dept. of Physics.
Point Coulomb Solutions of the Dirac Equation: Analytical Results Required for the Evaluation of the Bound Electron Propagator in Quantum Electrodynamics.
I. B. Whittingham. Dec 77, 16p
U.S. Sales Only.

The bound electron propagator in quantum electrodynamics is reviewed and the Brown and Schaefer angular momentum representation of the propagator discussed. Regular and irregular solutions of the radial Dirac equations for both /E/ < mc exp 2 and /E/ >or= mc exp 2 are required for the computation of the propagator. Analytical expressions for these solutions, and their corresponding Wronskians, are obtained for a point Coulomb potential. Some computational aspects are discussed in an appendix. (Atomindex citation 10:474541)

JINR-E-1-10870 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of High Energy.
Search for New Short-Lived Particles in pi exp - -Collisions with Emulsion Nuclei at 60 GeV/C.
B. P. Bannik, I. V. Bobaianov, and A. El-Naghy. 1977, 11p
U.S. Sales Only.

At investigation of about 10000 interactions of 60 GeV/c pi exp - -mesons with emulsion, one event, which can be interpreted as leptonic decay of a new short-lived particle, was detected. The average effective mass of this particle is approximately 2.4 GeV and its lifetime is approximately 1O exp - 14 sec. (Atomindex citation 10:443457)

JINR-E-1-11073 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of High Energy.
Study of the Interference Effect in Identical Particle Pairs for Inclusive Anti Pp-Interactions at 22.4 GeV/C.
V. V. Filippova, A. A. Loktionov, and Zh. S. Takibaev. 1977, 19p
U.S. Sales Only.

The interference effect in identical pion pairs has been investigated in anti pp-interactions with charge multiplicities Nsub(ch) (>=) 6 at 22.4 GeV/c using the data from the HBC "Ludmila". The effect was observed both on the delta delta - plot and in the effective mass spectra for pion pairs. The mean dimension and lifetime of the pion emission region were determined from the analysis of the delta delta -plot: < R > = (3.0+-0.5)fm and < r > = (3.1+-1.6) fm/c. The explanation for the observed relation between transverse and longitudinal dimensions (Rsub(tr) = (1.7+-0.4) fm, R=(4.4+-1.4) fm) was offered in the framework of the model of moving sources. (Atomindex citation 10:443494)

JINR-E-1-11257 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of High Energy.
Inclusive Production of delta exp ++ (1236) in Interactions at 22.4 GeV/C.
E. G. Boos, D. I. Ermilova, and V. V. Samoilov. 1978, 16p
U.S. Sales Only.

The inclusive and semi-inclusive production of delta exp ++ (1236) has been investigated in anti pp interactions at 22.4 GeV/c. The delta exp ++ cross section is 1.78+-0.18 mb in the region of modulus t <= 0.74 (GeV/c). The differential cross sections have been studied as a function of transverse and longitudinal Feynman variables. An evidence for the one-pion exchange contribution to the delta exp ++ inclusive process has been obtained from the decay angular distributions of delta exp ++ . (Atomindex citation 10:443466)

JINR-E-1-11542 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of High Energy.
Extrapolation of Deep Inelastic Lepton-Nucleon Cross Sections to SPS Energies.
M. Klein, and W. D. Nowak. 1978, 14p
U.S. Sales Only.

Double differential deep-inelastic lepton scattering cross sections and counting rates are extrapolated from existing data to kinematical regions which will be explored in the Dubna-CERN-Munich-Saclay muon experiments. Uncertainties of this extrapolation procedure are discussed and found to be limited by a factor of about two. (Atomindex citation 10:443374)

JINR-E-17-10550 PC **A03**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Theoretical Physics.
Lie Algebraical Aspects of Quantum Statistics. Unitary Quantization (A-Quantization).
T. D. Palev. 1976, 39p
U.S. Sales Only.

It is shown that the second quantization axioms can, in principle, be satisfied with creation and annihilation operators generating (in the case of n pairs of such operators) the Lie algebra Asub(n) of the group SL(n+1). A concept of the Fock space is introduced. The matrix elements of the operators are found. (Atomindex citation 09:392710)

JINR-E-2-10971 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Theoretical Physics.
Description of High-Energy Pp Scattering in the Quasipotential Approach.
M. I. Dzhgarkava, V. R. Garsevanishvili, L. N. Glonti, S. V. Goloskokov, and Yu. M. Kazarinov. 1977, 25p
U.S. Sales Only.

In the paper the data on the elastic pp-scattering at energies Esub(L) > or approximately 10 GeV and 0.05 < or approximately/t/ < or approximately 1.05 (GeV/c) exp 2 momentum transfers are completely described within the quasipotential approach. The experimental quantities are predicted. The quasipotential parameters are found, which allow to describe these data satisfactorily. (Atomindex citation 10:419900)

JINR-E-2-11079 PC **A03**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Theoretical Physics.
Geometric Approach to the Solution of Conformal Invariant Field Equations.
Eh. A. Tagirov, and I. T. Todorov. 1978, 35p
U.S. Sales Only.

Solutions to the nonlinear conformal invariant scalar wave equation are classified according to their invariance groups following the Bilyalov-Petrov classification of conformally flat spaces according to their isometry groups. A number of previously unknown solutions to this equation are found in this way. The relevance of these results to the solution of the SU(2) (or SU(2) THETA SU(2)) Yang-Mills equations is pointed out. Background material on the two notions of conformal symmetry for general pseudo-Riemannian manifolds is reviewed in order to make the exposition reasonably self-contained. (Atomindex citation 09:392728)

JINR-E-2-11093 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Computing Techniques and Automation.
Integrable Model of the Nonlinear Complex Scalar Field with the Nontrivial Asymptotics of N-Soliton Solutions.
B. S. Getmanov. 1977, 16p
U.S. Sales Only.

Field theory in two space-time dimensions is considered. It turns out to be complete integrable Hamiltonian system. The N-soliton subject to the boundary conditions (PSI) implies lambda exp -1 when (x) implies infinity have been found. (Atomindex citation 09:415171)

JINR-E-2-11193 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Theoretical Physics.
Deep Inelastic Lepton-Hadron Scattering in Massive Vector Gauge Models.
D. B. Stamenov. 1978, 18p
U.S. Sales Only.

A class of strong interaction models, in which the interactions between fractionally charged colored quarks are mediated by massive neutral vector gluons, is considered. All the vector gluons acquire masses via the usual Higgs mechanism. The effective coupling constants g (gauge coupling) and eta (quartic-self coupling) are supposed to approach a closed cycle in the limit of large space-like momenta Q. The large Q exp 2 behaviour of the moments for the deep inelastic lepton hadron structure functions is analysed using this hypothesis. It is shown that Bjorken scaling is violated by power terms of Q exp 2 multiplied by an oscillating function of Q exp 2 . (Atomindex citation 10:419938)

JINR-E-2-11271 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of High Energy.
Deep Inelastic Muon Scattering as a Test of Gauge Theories.
M. Klein, and T. Riemann. 1978, 11p
U.S. Sales Only.

Different asymmetries in polarized lepton scattering are shown to be remarkably dependent on the valence quark and lepton multiplet structure in SU(2)sub(L)xSU(2)sub(R)xU(1) gauge theories. The calculations using Mohapatra and Sidhu model, the Salam-Weinberg/GIM theory and De Rujula, Georgi and Glasshow model are compared. Therefore deep inelastic muon experiments at SPS energies can contribute significantly to the investigation of neutral currents. (Atomindex citation 10:443375)

JINR-E-2-11478 PC **A03**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Theoretical Physics.
Phase Space Representations. 1.
I. V. Polubarinov. 1978, 27p
U.S. Sales Only.

The Dirac representation theory deals usually with the amplitude formalism of the quantum theory. An introduction is given into a theory of some other representations, which are applicable in the density matrix formalism and can naturally be called phase space representations (PSR). They use terms of phase space variables (x and p simultaneously) and give a description, close to the classical phase space description. Definitions and algebraic properties are given in quantum mechanics for such PSRs as the Wigner representation, coherent state representation and others. Completeness relations of a matrix type are used as a starting point. The case of quantum field theory is also outlined. (Atomindex citation 10:442324)

JINR-E-2-11585 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Theoretical Physics.

New Method of the Derivation of the Quantum Field Theory Equations for the Determination of Green Functions. The Consideration of the Models gamma Phisup(4))sub(D), D=2,3 Via Green Functions Method.
L. G. Zastavenko. 1978, 23p
U.S. Sales Only.

A new derivation method of the usual Green function equations is given. The usual definition of the Green function is transformed. The gamma -integral is shown to be defined in some region M exp 2 <M sub 02 by infinitely narrow neighbourhoods of two points gamma = +- gamma sub 0 (H exp 2 ,g), gamma sub 02 >0. This fact corresponds to the vacuum degeneration in the region M exp 2 <M sub 02 . (Atomindex citation 10:438670)

JINR-E-2-11727 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Theoretical Physics.
Meson Form Factors and Covariant Three-Dimensional Formulation of Composite Model.
N. B. Skachkov, and I. L. Solovtsov. 1978, 20p
U.S. Sales Only.

An approach is developed which is applied in the framework of the relativistic quark model to obtain explicit expressions for meson form factors in terms of covariant wave functions of the two-quark system. These wave functions obey the two-particle quasipotential equation in which the relative motion of quarks is singled out in a covariant way. The exact form of the wave functions is found using the transition to the relativistic configurational representation with the help of the harmonic analysis on the Lorentz group instead of the usual Fourier expansion and then solving the relativistic difference equation thus obtained. The expressions found for form factors are transformed into the three-dimensional covariant form which is a direct geometrical relativistic generalization of analogous expressions of the nonrelativistic quantum mechanics and provides the decrease of the meson form factor by the Fsub(pi)(t) approximately t exp -1 law as -t infinity, in the Coulomb field. (Atomindex citation 10:439684)

JINR-E-2-11893 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Theoretical Physics.
Quantum Field Theory with a Momentum Space of Constant Curvature (Perturbation Theory).
R. M. Mir-Kasimov. 1978, 23p CONF-780796-1
International seminar on problems of high energy physics and field theory, Serpukhov, USSR, 11 Jul 1978.
U.S. Sales Only.

In the framework of the field-theoretical approach in which the off-the-mass shell extension proceeds in the p-space of constant curvature, the perturbation theory is developed. The configurational representation of the de Sitter space is introduced with the help of the Fourier transformation of the group of motions. On the basis of a natural generalization of the Bogolyubov causality condition to the case of the new configurational representation a perturbation theory is constructed with the local in xi space Lagrangian density funtion. The obtained S matrix obeys the requirement of translation invariance. The S matrix elements are given by convergent expressions. (Atomindex citation 10:474489)

JINR-E-2-12045 PC **A03**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Theoretical Physics.
O(4) Expansion on the Light-Cone.
D. Robaschik, E. Wieszorek, and G. Troeger. 1978, 22p
U.S. Sales Only.

The structure of the light-cone expansion of matrix elements of current commutators for electromagnetic or weak currents on the basis of general Quantum Field Theory is investigated. For this aim, the Jost Lehmann representation and the expansion of the spectral function in terms of Gegenbauer polynomials are used. The convergence of the O(4) expansion is proved. The connection between the expansion coefficients and the moments of the structure functions of deep-inelastic scattering is discussed. (Atomindex citation 10:472042)

JINR-E-4-11378 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Theoretical Physics.
Expansion of Continuum Functions on Resonance Wave Functions and Amplitudes. 2.
J. Bang, F. A. Gareev, M. H. Gizzatkulov, and S. A. Goncharov. 1978, 25p
U.S. Sales Only.

To overcome difficulties with wave functions of continuum spectrum (for example, in a shell model with continuum) the pole expansion (by the Mittag-Leffler theorem) of wave functions, scattering amplitudes and the Green functions at positive energies are considered. It is shown that resonance functions (the Gamow functions) form a complete set over which the continuum functions could be expanded. The general view of these expansions for final potentials is obtained and discussed. To illustrate general proofs of convergence of the obtained expansions some examples of delta and square-well potentials are considered. Numerical calculations show the convergence of these expansions to be fast. (Atomindex citation 10:443618)

JINR-E-4-11568 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Theoretical Physics.
Pion Polarizability in Nonlocal Quark Model.
G. V. Efimov, and V. A. Okhlopkova. 1978, 11p
U.S. Sales Only.

The gamma gamma implies pi pi amplitude was calculated in nonlocal quark model in the fourth order on the perturbation theory. The coefficients of electric(a) and magnetic polarizability (beta) determined are equal in magnitude and opposite in sign alpha sub(pi +-)= beta sub(pi +-)=+0.014 alpha /msub(pi)sup(3), alpha sub(pi sup(0))=-beta sub(pi sup(0))=-0.07 alpha /msub(pi)sup(3). The results have been compared with calculations in other models. (Atomindex citation 10:443329)

JINR-E2-11391 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Nuclear Problems.
Relation Between the Pomeron Intercept and the Triple-Pomeron Coupling.
B. Z. Kopeliovich, and L. I. Lapidus. 1978, 11p
U.S. Sales Only.

It is shown in the parton model (PM) that the pomeron intercept alpha /sub P/(0) = 1 + delta and the triple-pomeron coupling lambda are strongly correlated: delta = lambda. For this reason the critical behavior in the reggeon field theory is impossible. In the supercritical case PM allows one to distinguish between the conditions of validity of the Amati and Cardy approaches. (Atomindex citation 10:420515)

JINR-R-1-10698 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of High Energy.
Dependence of the Mean Values of pi exp +- Meson Squared Transverse Momenta on the Secondary Charge Particle Multiplicity in pi exp - p and pi exp - N Interactions at 40 GeV/C.
N. Angelov, V. G. Grishin, and E. T. Tsivtsivadze. 1977, 8p
In Russian.
U.S. Sales Only.

Based on the semiinclusive transverse momentum distributions of pi exp +- mesons produced in pi exp - p and pi exp - n interactions at 40 GeV/c, the prediction of the multiperipheral model on the behaviour of the spectrum slopes d sigmasub(n)/dksub(tr) exp 2 was checked. The observed increase of the slope with the multiplicity is explained by the influence of the repulsion effect between neighbouring particles. (Atomindex citation 10:419954)

JINR-R-1-10704 PC **A02**/MF **A01**
Tbilisskii Gosudarstvennyi Univ. (USSR).
Inclusive and Semi-Inclusive Distributions of Neutral Strange Particles Produced in pi exp - p Interactions at 4.9, 7.5 and 40 GeV/C.
S. V. Dzhmukhadze, E. N. Kladnitskaya, V. M. Popova, and G. P. Toneeva. 1977, 18p
In Russian.
U.S. Sales Only.

The results obtained in investigations of the inclusive and semi-inclusive distribution of lambda and K exp 0 particles produced in pi exp - p interactions at 4.9, 7.5 and 40 GeV/c are presented. The inclusive cross section of K exp 0 meson production is shown to increase with energy, in general, in the central region, while the inclusive cross section of lambda hyperons increases in the fragmentation region of target proton. The cross section of K exp 0 meson production grows more slowly that the cross section of lambda hyperon production. The PHI(x) normalized structure functions for K exp 0 mesons do not reach the scaling in the energy range considered; as to lambda hyperon, their PHI(x0 functions have scaling in a wide range on x: -0.5 (<=) x (<=) 0.1 beginning with 4.9 GeV/c. (Atomindex citation 10:443486)

JINR-R-1-11008 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of High Energy.
Multiplicity of Charged Particles and Charge Exchange Coefficients in pi exp - N Interactions at 40 GeV/C.
S. Batskovich, V. S. Murzin, L. M. Shcheglova, and V. M Shekhter. 1977, 17p
In Russian.
U.S. Sales Only.

Systematical errors and their influence on the average multiplicity and charge exchange in a propane bubble chamber are considered. It is shown that about 3% slow protons in some pi exp - P-events coefficient can not be seen, so these are identified as pi sup(-)n-events. This effect is very essential for average multiplicity correct determining, especially for charge exchange coefficient. It is found that the charge exchange coefficient at 40 GeV/c equals 0.34+-0.03 and agrees well with the data of other coefficient experiments. (Atomindex citation 10:443460)

JINR-R-1-11285 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Nuclear Problems.
Asymmetry in the Elastic Scattering of 630 MeV Protons by Deuterons.
Kh. Murtazaev, V. S. Nadezhdin, and V. I. Satarov. 1978, 6p
In Russian.
U.S. Sales Only.

Asymmetry in the elastic 630 MeV polarized proton scattering by deuterons has been measured. The experiment has been performed by means of two conjugated scintillation counter telescopes detecting both the scattered particles (the proton and the deuteron). The asymmetry angular dependence in proton elastic scattering by deuterons has been measured. The results obtained for the region of large angles are compared with the prediction of the resonance one-pion exchange model. (Atomindex citation 10:457476)

JINR-R-1-11293 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR).
Study on Inclusive Spectra of Secondary Charged Particles Produced in pi exp -12 C Interactions at 40 GeV/C.
N. Angelov, N. Akhababyan, and A. I. Anoshin. 1978, 13p
In Russian.
U.S. Sales Only.

The structure functions (E(d exp 3 sigma)/dp exp 3) for pi exp +- -mesons produced in pi exp -12 C interactions at Psub(pi)=40 GeV/c have been studied as a function of transverse momentum (Psub(tr)). For Psub(tr) (>=) 0.15 GeV/c the distributions have an exponential form, the slope parameters for pi exp +- -mesons emitted forward (in lab. c.s.) being near to each other and differing slightly from those for pp- and p nuclear interactions in a wide range of primary energies. The structure functions for leading particles and pi exp +- -mesons with energy E (>A 0.3 E sub 0 (E-energy of colliding pi exp - -meson) coincide. The powers in the A dependence of the invariant cross section ratio for pi exp -12 C and pi exp - p interactions are nearly equal to 1 for pi exp +- mesons with Psub(tr) (>=) 0.15 GeV/c. (Atomindex citation 10:443446)

JINR-R-1-11325 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of High Energy.
Secondary Particle Multiplicity Depending on the Collisions of pi exp - -Mesons with exp 12 C Nucleons at p=40 GeV/C.
N. S. Angelov, V. G. Grishin, Yu. Nad, T. Kanarek, and S. Batskovich. 1978, 9p
In Russian.
U.S. Sales Only.

The multiplicities of secondary charged particles in pi exp -12 C-interactions with nu -protons of carbon nucleus at p=40 GeV/c (nu =1-5) is presented. It is shown that the dependence of the average values of particle multiplicities on nu approximately equals the < n > dependence on initial pion energy in pi exp - p-interactions in the range from 40 to 200 GeV. KNO scaling and the Wroblewski empirical law for interactions with several nucleons of exp 12 C nucleus are observed. (Atomindex citation 10:443447)

JINR-R-1-11481 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Nuclear Problems.
Production of Strange Particles in pi exp - p Interactions at 5 GeV/C. Part 2. Investigation of Properties of Charged and Neutral Meson Production in pi exp - p Interactions Accompanied by Strange Particles.
Yu. A. Budagov, V. B. Vinogradov, and A. G. Volod'ko. 1978, 19p
In Russian.
U.S. Sales Only.

The data are obtained on multiple production of charged and neutral particles accompanied by strange particles in pi exp - p interactions at 5 GeV/c. The comparison of these data to corresponding values for the reactions without strange particles indicates that a number of characteristics of the above two processes are similar. This similarity is also observed for distributions over associative production of lambda exp 0 hyperons at 5 GeV/c and at energies of (>=) 40 GeV/c. (Atomindex citation 10:439590)

JINR-R-1-11615 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of High Energy.
Mechanism of the Np Implies Pp pi exp + pi exp - pi exp - pi exp 0 Reaction at Psub(N)=(5.10+-0.17) GeV/C.
A. Abdivaliev, C. Besliu, A. P. Casparyan, S. Gruia, and A. P. Ierusalimov. 1978, 15p
In Russian.
U.S. Sales Only.

The mechanism of the np implies pp pi exp + pi exp - pi exp - pi exp 0 reaction at Psub(n)=(5.10+-0.17) GeV/c is investigated. A matrix element is presented by which the above reaction is mainly described. The reaction goes through the lambda exp ++ isobar formation (approximately 50%) and the omega exp 0 -meson formation (approximately 6%). The delta exp ++ isobar is produced in a significant number of events through a peripherical mechanism. Angular distributions of the produced particles do not contradict an assumption about redispersion of secondary nucleons with producing one pi -meson. The production of the omega exp 0 -meson is likely due to the pi -meson exchange in the np implies pp omega exp 0 pi exp - reaction. (Atomindex citation 10:439697)

JINR-R-1-9198 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR).
Study on the Energy Dependence of Anti Nsub(Max) and Anti Tsub(Max) in Showers Produced in Liquid Xenon by 1600-3400MeV gamma Quanta.
B. Slovinskii, B. Srednyava, and Z. Strugal'skii. 1975, 9p
In Russian.
U.S. Sales Only.

The results of the analysis of the dependence of a number of particles in the electron-photon shower maximum and of the maximum position on the energy are presented for gamma quanta range 1600-3400 MeV. (Atomindex citation 10:420000)

JINR-R-1-9882 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of High Energy.
Study on the Semi-Inclusive pi exp - N Reactions at p=40 GeV/C.
N. Angelov, K. P. Vishnevskaya, and V. G. Grishin. 1976, 21p
In Russian.
U.S. Sales Only.

The properties of secondary particles (pi sup(+-)-mesons, gamma -quanta) are investigated in pi exp - p, pi exp - n and pi exp - C exp 12 semi-inclusive interactions at 40 GeV/c. It is found, that the structure functions of the pi sup(+-)-mesons and gamma -quanta are independent of the type of the target (p, n, C exp 12). The transverse momentum distributions of secondary particles are also studied. (Atomindex citation 09:413344)

JINR-R-2-11430 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR).
Geometric Approach to the Dynamics of a Relativistic String.
B. M. Barbashov, and A. L. Koshkarov. 1978, 16p
In Russian.
U.S. Sales Only.

The problems of the classical dynamics of a relativistic string are related to the theory of two-dimensional extremal surfaces in n-dimensional pseudo-Euclidean space Esub(n)sup(1). In the three-dimensional space-time E sub 31 one can use the Gaussian theory of two-dimensional surfaces when a surface is defined by the first and second quadratic form. By integrating the derivational formulae for the basic vectors one can obtain the representations for these vectors in a certain basis, which satisfy the orthonormal gauge and d'Alembert equation in the dynamics of a string. These representations allow the generalizations to the pseudo-Euclidean space Esub(n)sup(') of any dimensionality n. A representation containing n-2 arbitrary functions and satisfying the gauge conditions, equations of motion and boundary conditions for the free string is obtained for the relativistic string in the space. (Atomindex citation 10:419383)

JINR-R-4-11156 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Theoretical Physics.
Low Boundary Energy of a Many-Fermion System.
E. B. Bal'butsev, and I. N. Mikhailov. 1977, 9p
In Russian.
U.S. Sales Only.

The translation-invariant system of N identical fermions with binary interaction is considered. Suggested is an improved method for estimating the E energy low boundary in the E sub 0 fermion system main state. The E/E sub 0 ratio has been calculated for N <= 10 and compared with the data of Carr and Post. The comparison has shown that the above method produces better results in the case of N <= 9; while under condition of N >= 10 the Hall method is preferable. (Atomindex citation 10:442237)

JINR-R-4-11339 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Nuclear Reactions.
Calculation of the (HI, Xn) Reaction Excitation Functions.
S. A. Karamyan. 1978, 15p
In Russian.
U.S. Sales Only.

The calculation of some values characteristic of the heavy ion-induced reaction of compound nucleus decay is investigated. According to the usual hypotheses of the statistical model and using the unified type of evaporation spectrum approximately epsilon e/sup epsilon/T/ d epsilon formula has been derived for evaluating the probability P/sub x/(E) for the evaporation of a fixed number of neutrons (x) by a compound nucleus with the excitation energy E. This formula is more precise than the available ones. On its basis expressions were obtained for the calculation of the (HI,xn) reaction excitation functions with account of angular momentum, distributions over angular momentum of x neutron evaporation products, and distributions over residual excitation energy and angular momentum of compound nuclei after neutron evaporation reaction final product. Numerical calculations for the excitation function and the mentioned distributions for the exp 120 Sn(exp 40 Ar, 4n) exp 156 Er reaction are given as an example. These calculations are essential for interpreting the experimental data on the population of rotational bands in the (HI,xn) reactions. The influence of effects due to pairing of nucleons and nucleus shell structure on the (HI,xn) reaction excitation functions are discussed. (Atomindex citation 10:443654)

JINR-R-4-11424 PC **A03**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Theoretical Physics.
Collective Nuclear Model at High Angular Momenta (General Formulation).
I. N. Mikhailov. 1978, 26p
In Russian.
U.S. Sales Only.

The collective nuclear model is considered in connection with a symmetry of rotating nuclei. It is shown that the states with large angular momenta in the vicinity of the yrast line may be classified by an asymptotic quantum number (signature) giving the phase which the intrinsic wave-function acquires when the body-fixed frame is rotated through the angle pi around the axis of maximal inertia. The asymptotic expressions for the matrix elements of E(lambda) operators are given. The pattern of spectrum at large angular momenta is discussed. (Atomindex citation 10:443664)

JINR-R-4-11778 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Neutron Physics.
Momentum of the Photon in a Medium with Negative Group Velocity.
I. M. Frank. 1978, 8p
In Russian.
U.S. Sales Only.

In the paper we discuss a validity of the expression p=nh nu /c for the photon momentum in the refractive medium both for the Vavilov-Cherenkov radiation and for the refraction of light on the surface of the medium with negative group velocity (the photon in the medium is looked upon as a quasiparticle). The photon momentum and the velocity of the photon motion appear to be in the opposite directions, that fact corresponds to the negative mass of the quasiphoton. Light pressasure in the medium with negative group velocity is shown to be negative. (Atomindex citation 10:474447)

JINR-1-10555 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of High Energy.
Study on Associative Multiplicities in pi exp - p Interactions at 5 GeV/C.
L. I. Zhuravleva, R. M. Lebedev, I. S. Saitov, N. K. Kutsidi, and G. Martinska. 1977, 17p
In Russian.
U.S. Sales Only.

The results of an experimental study of associative multiple production in pi exp - p interactions at 5 GeV/c are presented for approximately 2x10 exp 4 events detected in a 1-meter hydrogen bubble chamber. The dependences of the associated particle multiplicity on the rapidity and the transverse momentum of discriminated pi exp +- - mesons, and also on the square of the missing mass Msub(x) exp 2 to discriminated proton and pi exp - meson are studied. The results obtained are presented in the form of drawings. The experimental data are compared with the predictions of models. A satisfactory qualitative description based on the statistical model of excited states is obtained for the dependence of the multiplicity on the rapidity. The dependence of the multiplicity on Msub(x) exp 2 is described satisfactorily according to predictions of the multiperipheral model and the model with the production of clusters of the type "nova". The results obtained indicate the possibility of the application of the associative multiplicities technique at relatively small energies. (Atomindex citation 09:413373)

JINR-1-10566 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of High Energy.

Dependence of Associative Multiplicity on Missing Mass Square in pi exp - p Interactions at 40 GeV/C.
L. N. Abesalashvili, N. S. Amaglobeli, N. K. Kutsidi, R. G. Salukvadze, and L. A. Slepchenko. 1977, 15p
In Russian.
U.S. Sales Only.

The statistics of approximately 10000 inelastic pi exp - p interactions at 40 GeV/c, detected in a two-meter propane bubble chamber, is used for a study of the multiplicity of charged particles, associated with a discriminated pi exp - meson and proton, depending on the square of the missing mass Msub(x)sup(2) to a discriminated particle. The obtained results, presented in the form of plots, are compared with the predictions of the multiperipheral model, diffraction model and the model of coherent states. The dependence of associative moments of the second and third orders on Msub(x)sup(2) is studied. The indications of realization of KNO scaling for associative multiplicities at high values of Msub(x)sup(2) are obtained. (Atomindex citation 09:413339)

JINR-1-11480 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Nuclear Problems.
Matrix Element of the pi exp - p Implies pi exp 0 pi exp 0 N Reaction Near the Threshold.
A. A. Bel'kov, S. A. Bunyatov, B. Zh. Zalikhanov, V. S. Kurbatov, and A. Khalbaev. 1978, 12p
In Russian.
U.S. Sales Only.

The phenomenological matrix element which allows one to describe the gamma -spectra from the pi exp - p implies pi exp 0 pi exp 0 n reaction near the threshold is obtained. The efficiencies of the gamma quanta detection from the pi exp - p implies pi exp 0 pi exp 0 n reaction, calculated with the new matrix element, are in accordance with the Cerenkov counter data obtained at different geometries. The total cross section of the pi exp - p implies pi exp 0 pi exp 0 n reaction at 270 MeV is equal to (0.26+-0.02) mb. The isotopic analysis of the pi N implies pi pi N reaction at this energy is performed. The isotopic amplitudes ratio X=F sub 10 /F sub 32 is equal to 4.4+-0.4. (Atomindex citation 10:420108)

JINR-13-12004 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Nuclear Problems.
Measurement Integral Technique of Angular Distributions.
I. I. Gaisak, and K. O. Oganesyan. 1978, 11p
In Russian.
U.S. Sales Only.

The possibility of application of integral technique to study angular distributions is considered. The Fredholm integral equation of the first kind must be solved for reestablishing differential cross sections. The estimations of reachable precisions for angular distributions for PION installation are performed. (Atomindex citation 10:470871)

KFKI-1978-96 PC **A03**/MF **A01**
Kozponti Fizikai Kutato Intezet, Budapest (Hungary).
Empirical Continuation of the Differential Cross Section.
I. Borbely. Dec 78, 41p
U.S. Sales Only.

The theoretical basis as well as the practical methods of empirical continuation of the differential cross section into the nonphysical region of the cos theta variable are discussed. The equivalence of the different methods is proved. A physical applicability condition is given and the published applications are reviewed. In many cases the correctly applied procedure turns out to provide nonsignificant or even incorrect structure information which points to the necessity for careful and statistically complete analysis of the experimental data with a physical understanding of the analysed process. (Atomindex citation 10:477589)

LA-UR-79-3332 PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
Neutron Cross Section Calculations for Fission-Product Nuclei.
E. D. Arthur, and D. G. Foster, Jr. 1979, 13p
CONF-791223-1
Contract W-7405-ENG-36
NEANDC specialist meeting on neutron cross sections of fission product nuclei, Bologna, Italy, 12 Dec 1979.

To satisfy nuclear data requirements for fission-product nuclei, Hauser-Feshbach statistical calculations with preequilibrium corrections for neutron-induced reactions on isotopes of Se, Kr, Sr, Zr, Mo, Sn, Xe, and Ba between 0.001 and 20 MeV. Spherical neutron optical parameters were determined by simultaneous fits to resonance data and total cross sections. Isospin coefficients appearing in the optical potentials were determined through analysis of the behavior of s- and p-wave strengths as a function of mass for a given Z. Gamma-ray strength functions, determined through fits to stable-isotope capture data, were used in the calculation of capture cross sections and gamma-ray competition to particle emission. The resulting (n, gamma), (n,n'), (n,2n), and (n,3n) cross sections, the secondary neutron emission spectra, and angular distributions calculated for 19 fission products will be averaged to provide a resulting ENDF-type fission-product neutronics file. 11 references. (ERA citation 05:009439)

LA-UR-80-102 PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
Rotation-Vibration Structure of Even-A Samarium and Gadolinium Isotopes.
H. H. Hsu, and S. A. Williams. 1980, 4p CONF-800213-5
Contract W-7405-ENG-36
Band structure and nuclear dynamics conference, New Orleans, LA, USA, 28 Feb 1980.

The extended rotation-vibration model, which consists of an asymmetric rotor and breathing mode deformation vibrations, was applied to several even-A samarium and gadolinium isotopes. The comparison between the theoretical and experimental energy levels and the comparison with other model calculations are presented. Also shown are the comparison between the experimental and theoretical B(E2) ratios for the isotopes studied. 1 figure, 2 tables. (ERA citation 05:014500)

LA-UR-80-103 PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
Intrinsic State for the Interacting Boson Model.
J. N. Ginocchio, and M. W. Kirson. 1980, 4p CONF-800213-6
Contract W-7405-ENG-36
Band structure and nuclear dynamics conference, New Orleans, LA, USA, 28 Feb 1980.

A form is suggested for an intrinsic state for the interacting boson model that allows a connection to be made with the familiar geometrical description of collective nuclei. (ERA citation 05:014515)

LA-UR-80-119 PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
Finite Boson Representation of Monopole and Quadrupole Fermi Pairs.
J. N. Ginocchio. 1980, 4p CONF-800213-4
Contract W-7405-ENG-36
Band structure and nuclear dynamics conference, New Orleans, LA, USA, 28 Feb 1980.

The monopole and quadrupole fermion pairs of a monopole and quadrupole pairing model can be represented by a finite expansion in terms of monopole and quadrupole bosons. (ERA citation 05:014511)

LA-UR-80-235 PC **A03**/MF **A01**
State Univ. of New York at Stony Brook.
Generalized Seniority Scheme for Bands in Odd-A Nuclei.
M. Gai, A. Arima, and D. Strottman. 1980, 43p CONF-800213-3
Contract W-7405-ENG-36
Band structure and nuclear dynamics conference, New Orleans, LA, USA, 28 Feb 1980.

The microscopic generalized seniority scheme is applied for the description of bands in odd-A nuclei. A perturbation expansion in terms of the core-particle interaction is performed. The first-order correction for the band head and the first member of the band is discussed. The specific band structure of a given nucleus, as well as the systematic trend of bands, is described in an explicit N-dependent analytical formula. This formula involves a linear dependence on N which arises from the first-order perturbation expansion. This term is shown responsible for the large deviation of the 11/2 exp - delta J=2 band spacing in I isotopes from the spacing of the Te core. All observed band structures of an odd-A nucleus arise from one simple core-particle coupling. Hence decoupled-E2 bands and strongly coupled delta J=1 bands, particle or hole bands of low-spin or high-spin orbits, all follow one simple N-dependence. This uniformity of bands is manifested in E2 bands in sub 53 I isotopes and deltaJ=1 bands in sub 51 Sb that have the same sub 52 Te cores. For the calculations a particle-particle force with a large contribution from a g delta force is used with a coupling constant that is deduced from exp 210 Pb. 1 figure. (ERA citation 05:014493)

LA-UR-80-46 PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
Two-Neutron Transfer Study on exp 195 Pt.
J. A. Cizewski, E. R. Flynn, R. E. Brown, and J. W. Sunier. 1980, 4p CONF-800213-1
Contract W-7405-ENG-36
Band structure and nuclear dynamics conference, New Orleans, LA, USA, 28 Feb 1980.

The exp 195 Pt(t,p) exp 197 Pt reaction was investigated. Three states below 1 MeV are populated with a large fraction of the L = 0 strength, which is seen in the even-to-even cases. This is in contrast to other (p,t) and (t,p) studies on Pt targets, where the L = 0 strength is concentrated in the ground state. 1 figure, 1 table. (ERA citation 05:014505)

LA-UR-80-79 PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
Fragmentation of Elementary Excitations in the Transitional Molybdenum Isotopes.
E. R. Flynn, F. Ajzenberg-Selove, R. E. Brown, J. A. Cizewski, and J. W. Sunier. 1980, 3p CONF-800213-2
Contract W-7405-ENG-36
Band structure and nuclear dynamics conference, New Orleans, LA, USA, 28 Feb 1980.

A two-nucleon-transfer study of the molybdenum isotopes was carried out to investigate the transitional character of these nuclei. The results indicate that the lighter nuclei have spherical shell model characteristics whereas the heavier nuclei are rapidly becoming deformed. 1 table. (ERA citation 05:014498)

LA-7966 PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
Extraction of the Michel Parameters from Muon Decay by a Maximum Likelihood Method.
R. J. McKee. Jan 80, 9p
Contract W-7405-ENG-36

A maximum likelihood method was developed for extracting the Michel parameters, which describe the decay spectrum of stopped polarized muons. The method was applied successfully in a Monte Carlo simulation of apparatus. A complete error matrix for the set of Michel parameters was also obtained. In an experiment of 10 exp 8 muon decays the statistical errors can be reduced by more than an order of magnitude over the currently accepted limits on the Michel parameters. 5 tables. (ERA citation 05:014465)

LA-8059-T PC **A06**/MF **A01**
Los Alamos Scientific Lab., NM.
Analyzing Power and Differential Cross Section for Pion-Deuteron Production by 0.8-GeV Polarized Protons on Hydrogen.
R. J. Joseph. Oct 79, 105p
Contract W-7405-ENG-36
Thesis. Submitted to Univ. of Texas, Austin.

A 0.8-GeV polarized proton beam was used to measure the analyzing power and unpolarized differential cross section for the reaction pp implies d pi exp + . Eight multiwire proportional counters were used in a two-arm system to detect both the deuteron and pion for left-right scattering. Reversal of the beam polarization every three minutes and use of the two-arm system removed systematic errors from the analyzing power measurement. A fit of the analyzing power to a phenomenological

model indicates the importance of d- and f-wave pions at this energy. The unpolarized cross-section data does not support d-wave pions. This underlines the sensitivity of the analyzing power to different pion partial waves. (ERA citation 05:010768)

LBL-10389 PC **A07**/MF **A01**
California Univ., Berkeley. Lawrence Berkeley Lab.
Gamma and Pizero Production in E exp + E exp - Annihilation.
A. Fong. Jan 80, 129p
Contract W-7405-ENG-48
Thesis.

Inclusive cross sections of gamma 's and pi exp 0 mesons in hadronic events produced by electron-positron annihilation for the center-of-mass energy range 4.9 to 7.4 GeV are presented. Scale invariance of the inclusive spectra is exhibited in this energy range, and their normalization and shape are seen to be consistent with those of spectra arising from the decay of the pi exp 0 . The fraction of center-of-mass energy carried away by the gamma 's at high energies is found to be < E/sub gamma //E/sub c.m./> = 0.24 +- 0.01. The pi exp 0 inclusive cross section is seen to be consistent in normalization and shape with half the charged- pi cross section between x = 0.15 and 0.75, with an integrated inclusive cross-section ratio of sigma(pi exp 0)/(sigma(pi exp +) + sigma(pi exp -)) = 0.48 +- 0.05. 60 figures, 7 tables. (ERA citation 05:014464)

LBL-9638 PC **A02**/MF **A01**
California Univ., Berkeley. Lawrence Berkeley Lab.
Multiple Nucleon Transfer in Damped Nuclear Collisions.
J. Randrup. Jul 79, 18p
Contract W-7405-ENG-48

This lecture discusses a theory for the transport of mass, charge, linear, and angular momentum and energy in damped nuclear collisions, as induced by multiple transfer of individual nucleons. 11 references. (ERA citation 05:009467)

LBL-9902 PC **A03**/MF **A01**
California Univ., Berkeley. Lawrence Berkeley Lab.
Nuclear Collisions at Several Tens of MeV Per Nucleus.
J. Randrup. Oct 79, 34p
Contract W-7405-ENG-48

Nuclear beams with energies of several tens of MeV per nucleon will soon be available at a number of research centers around the world. Such beams offer a tool for probing new aspects of nuclear structure and dynamics. As the energy is raised models and concepts developed for the relatively well studied lower energy domain will be pressed to their limits and are likely to grow obsolete as novel phenomena enter the scene. The theory of ordinary damped collisions is considered; the testing of such theories is one important aspect of the research with higher beam energies. Another is the search for truly novel phenomena, and some more speculative material on that aspect are given. 15 references. (ERA citation 05:012781)

NORDITA-78-13 PC **A02**/MF **A01**
Nordisk Inst. for Teoretisk Atomfysik, Copenhagen (Denmark).
Coupling Between Phase Solitons and Strain Near the Commensurate-Incommensurate Transition.
P. Bak, and J. Timonen. May 78, 14p
U.S. Sales Only.

Near the commensurate-incommensurate transition the incommensurate phase is characterised by the formation of 'discommensurations' or phase solitons. The coupling to an elastic strain along the wave vector describing the modulation is considered. The solitons induce a highly non-homogeneous soliton-like strain. The measurable macroscopic strain is proportional to the phase soliton density. The transition remains second order in contrast to previous expectations. (Atomindex citation 10:477577)

ORNL/TM-7148 PC **A03**/MF **A01**
Oak Ridge National Lab., TN.
Measurement of the Average Number of Prompt Neutrons Emitted Per Fission of exp 235 U Relative to exp 252 Cf for the Energy Region 500 EV to 10 MeV.
R. Gwin, R. R. Spencer, R. W. Ingle, J. H. Todd, and H. Weaver. Jan 80, 37p ENDF-289
Contract W-7405-ENG-26

The average number of prompt neutrons emitted per fission nu /sub p/-bar(E), was measured for exp 235 U relative to nu /sub p/-bar for the spontaneous fission of exp 252 Cf over the neutron energy range from 500 eV to 10 MeV. The samples of exp 235 U and exp 252 Cf were contained in fission chambers located in the center of a large liquid scintillator. Fission neutrons were detected by the large liquid scintillator. The present values of nu /sub p/-bar(E) for exp 235 U are about 0.8% larger than those measured by Boldeman. In earlier work with the present system, it was noted that Boldeman's value of nu /sub p/-bar(E) for thermal energy neutrons was about 0.8% lower than obtained at ORELA. It is suggested that the thickness of the fission foil used in Boldeman's experiment may cause some of the discrepancy between his and the present values of nu /sub p/-bar(E). For the energy region up to 700 keV, the present values of nu /sub p/-bar(E) for exp 235 U agree, within the uncertainty, with those given in ENDF/B-V. Above 1 MeV the present results for nu /sub p/-bar(E) range about the ENDF/B-V values with differences up to 1.3%. 6 figures, 1 table. (ERA citation 05:012774)

ORO-1316-T1 PC **A03**/MF **A01**
Rice Univ., Houston, TX. Bonner Nuclear Labs.
Nuclear Structure at Intermediate Energies. Progress Report, April 1, 1979-March 31, 1980.
G. C. Phillips, and G. S. Mutchler. 1979, 43p
Contract EY-76-C-05-1316

Progress was made during the year on data analysis on ten experimental topics. Theoretical contributions were made to four of these topics. Three publications resulted. During the year a new experiment (p + p implies p pi exp + n) was initiated, and preliminary analysis shows large polarization asymmetries. Two Ph.D. degrees were awarded to student members of the group. Three papers in this report with significant data are indexed individually. (ERA citation 05:012729)

ORO-3992-368 PC **A03**/MF **A01**
Texas Univ. at Austin. Center for Particle Theory.
Leptonic Decays of the omega exp -.
D. A. Dicus, and J. R. Letaw. Aug 79, 27p
Contract EY-76-S-05-3992

Branching ratios, widths, and lepton energy spectra are derived for the leptonic decays of the omega exp - into xi exp 0 and xi exp 0 *. The calculations are made by hypothesizing that higher order multipoles in an expansion of the baryon current are zero. The axial vector coupling is determined using the bag model. (ERA citation 05:012743)

ORO-3992-372 PC **A03**/MF **A01**
Texas Univ. at Austin. Dept. of Physics.
De Sitter Fibers and SO(3,2) Spectrum Generating Group for Hadrons.
A. Bohm. Oct 79, 29p CONF-790246-1
Contract EY-76-S-05-3992
Symposium on symmetries in science, Carbondale, IL, USA, Feb 1979.

Ideas of general relativity theory are applied to hadron physics. A vague description of Drechsler's de Sitter fiber bundle is given first, followed by a brief review of Biedenharn and van Dam's dynamical stability group, which functions as a spectrum-generating group. The theory presented can be understood as a combination of the two above proposals: the system which this theory describes is called the rigid relativistic rotator. This idea is slightly generalized by allowing for a discrete number of radii of the de Sitter fibers instead of one radius, which can be interpreted as taking for the de Sitter radius an operator with discrete spectrum instead of a number, and by taking-instead of Biedenharn and van Dam's representations of SO(3,2)--a more complicated representation. This generalization is the general relativistic rotator. The particle spectrum of this de Sitter rotator is then compared with the experimental data on experimental evidence for the de Sitter spectrum. 2 figures, 1 table. (ERA citation 05:012737)

ORO-3992-376 PC **A02**/MF **A01**
Academia Sinica, Beijing (China). Inst. of High Energy Physics.
Simple Spacetime Description of High Energy Hadron-Nucleus Collisions.
W. Chao, C. B. Chiu, Z. He, and D. M. Tow. Nov 79, 15p
Contract EY-76-S-05-3992

A simple space-time description of high-energy hadron-nucleus collisions is presented. The model is based on the two-sheet description of soft multiparticle production in hadron-hadron collisions, and can be formulated in a parton framework. This zero-parameter model agrees well with the general features of hadron-nucleus data. 3 figures. (ERA citation 05:012782)

PB80-170467 PC **A05**/MF **A01**
Netherlands Energy Research Foundation ECN, Petten.
Radiative Capture of Polarized Neutrons in 51V and 141Pr Nuclei.
Master's thesis,
J.B.M. de Haas. Dec 79, 77p ECN-79

This thesis describes the experiments and results on circular polarization and angular distribution of primary neutron capture gamma rays from vanadium and praseodymium nuclei. Experiments were performed at the 45 MW high flux reactor in Petten.

SLAC-PUB-2419 PC **A02**/MF **A01**
Stanford Linear Accelerator Center, CA.
Review of E exp + E exp - Reactions in the Energy Range 3 to 9 GeV.
J. Kirkby. Oct 79, 15p CONF-790885-11
Contract EY-76-C-03-0515
International symposium on lepton and photon interactions at high energy, Batavia, IL, USA, 23 Aug 1979.

The current experimental status of the tau and charmed particles in medium-energy e exp + e exp - annihilations is reviewed. (ERA citation 05:012724)

SLAC-PUB-2421 PC **A02**/MF **A01**
Stanford Linear Accelerator Center, CA.
Results on Two-Photon Interactions from Mark II at SPEAR.
G. S. Abrams, M. S. Alam, and C. A. Blocker. Oct 79, 17p CONF-7908102-1, LBL-10016
Contract EY-76-C-03-0515
International conference on two-photon interactions, Lake Tahoe, CA, USA, 30 Aug 1979.

Preliminary results on two-photon interactions from the SLAC-LBL Mark II magnetic detector at SPEAR are presented. The cross section for eta' production by the reaction e exp + e exp - implies e exp + e exp - eta' has been measured over the beam energy range from 2 to 4 GeV. The radiative width GAMMA/sub gamma gamma /(eta') has been determined to be 5.8 +- 1.1 keV (+- 20% systematic uncertainty). Upper limits on the radiative widths of the f(1270), and A sub 2 (1310) and f'(1515) mesons have been determined. (ERA citation 05:010756)

SLAC-PUB-2426 PC **A02**/MF **A01**
Stanford Linear Accelerator Center, CA.
Recent Results in E exp + E exp - Annihilation from SLAC.
D. L. Scharre. Nov 79, 21p CONF-7909104-2
Contract EY-76-C-03-0515
10. international symposium on multiparticle dynamics, Goa, India, 25 Sep 1979.

Recent results from the Mark II and Crystal Ball experiments at SLAC are presented. Mark II results include measurement of direct photon production at the psi and observation of charmed baryon production. The Crystal Ball experiment sees evidence for a new state at 2.98 GeV produced in a radiative transition from the psi'. (ERA citation 05:012725)

SLAC-PUB-2429 PC **A03**/MF **A01**
Stanford Linear Accelerator Center, CA.
Recent Results from the Mark II Detector at SPEAR.
Nov 79, 26p LBL-10132, CONF-7910116-1

Contract EY-76-C-03-0515
Annual meeting of the American Physical Society, Montreal, Canada, 25 Oct 1979.

Recent results rom the Mark II Detector at SPEAR are presented. These include measurements of the decays tau exp - implies rho exp - nu /sub tau/ and tau exp - implies K* exp - (890) nu /sub tau/, observation of direct photons at the psi, inclusive proton and lambda production and measurements of charmed baryon and charmed meson decays. (ERA citation 05:010757)

SLAC-PUB-2433 PC **A05/MF A01**
Stanford Linear Accelerator Center, CA.
QCD Phenomenology of the Large P/sub T/ Processes.
R. Stroynowski. Nov 79, 77p CONF-790774-3
Contract EY-76-C-03-0515
SLAC summer institute on particle physics: quantum chromodynamics, Stanford, CA, USA, 9 Jul 1979.

Quantum Chromodynamics (QCD) provides a framework for the possible high-accuracy calculations of the large-p/sub T/ processes. The description of the large-transverse-momentum phenomena is introduced in terms of the parton model, and the modifications expected from QCD are described by using as an example single-particle distributions. The present status of available data (pi , K, p, p-bar, eta, particle ratios, beam ratios, direct photons, nuclear target dependence), the evidence for jets, and the future prospects are reviewed. 80 references, 33 figures, 3 tables. (ERA citation 05:012738)

SLAC-PUB-2436 PC **A02/MF A01**
Stanford Linear Accelerator Center, CA.
Simple Model of the Ground State of Quantum Chromodynamics.
K. Johnson. 1979, 12p CONF-7910116-2
Contract EY-76-C-03-0515
Annual meeting of the American Physical Society, Montreal, Canada, 25 Oct 1979.

A proposal for the form of the ground-state wave function of quantum chromodynamics is made. It is shown to lead to the phenomenology of the MIT Bag Model. The parameters of this model are related to the fundamental scale parameter of QCD. 2 tables. (ERA citation 05:010818)

SLAC-PUB-2442 PC **A02/MF A01**
Weizmann Inst. of Science, Rehovoth (Israel).
Theoretical Interpretation of E exp + E exp - Results.
H. Harari. Dec 79, 17p WIS-79/62-Ph, CONF-790885-9
Contract EY-76-C-03-0515
International symposium on lepton and photon interactions at high energy, Batavia, IL, USA, 23 Aug 1979, Portions of document are illegible.

Recent experimental results and theoretical ideas related to e exp + e exp - scattering are reviewed. 43 references. (ERA citation 05:012726)

UH-511-367-79 PC **A02/MF A01**
Hawaii Univ., Honolulu. Dept. of Physics and Astronomy.
Fun with W, Z, H, and G'S.
E. Ma. Nov 79, 7p
Contract EY-76-C-03-0511

Possible departures from the canonical orthodoxy represented by the Weinberg-Salam model and QCD are discussed. A model with 2 W's and 2 Z's is presented, as well as speculations on the Higgs-boson mass and the number of flavors and colors. 14 references. (ERA citation 05:012736)

20I. Plasma Physics

AD-A082 432/6 PC **A02/MF A01**
Texas Tech Univ Lubbock Plasma Lab
Dense Plasma Heating and Radiation Generation.
Annual rept. no. 4, 1 Nov 77-31 Oct 78,
M. Kristiansen, and M. O. Hagler. 2 Jan 79, 18p
AFOSR-TR-80-0217
Grant AFOSR-74-2639

During the past year, the carbon dioxide laser transferred from the AFWL-DYP was modified to run at 10.6 microns and 9.6 microns simultaneously and reliably. A plasma source designed for beat-heating experiments was built and fully diagnosed. Some preliminary investigations of laser plasma interactions were conducted with the plasma source. Beam filamentations were observed when the laser beam was focused through plasma. Attempts to observe parallel beam beat-heating were made, although results did not indicate any significant enhanced heating process. The computer code for analyzing laser-plasma interactions was further improved. An experiment to test the validity of the code's predictions was also designed. A novel experimental arrangement for anti-parallel beat-heating was designed and is being implemented. (Author)

AD-A082 579/4 Not available NTIS
California Univ Irvine Dept of Physics
Fundamental Radiative Instability of Accelerated Plasmas,
Robert Buschauer, and Gregory Benford. 18 Aug 78, 11p UCI-TR-78-6, ARO-15118.1-P
Grant DAAG29-78-G-0020
Availability: Pub. in Physics of Fluids, v22 n7 p1297-1305 Jul 79 (No copies furnished by DTIC).

No abstract available.

AD-A082 813/7 Not available NTIS
Bern Univ (Switzerland) Inst Fuer Angewandte Physik
Resonance Absorption of 1.06-micrometers Laser Radiation in Laser-Generated Plasma.
Forschungsbericht,
J. E. Balmer, and T. P. Donaldson. 31 Aug 77, 6p
Availability: Pub. in Physical Review Letters, v39 n17 p1084-1087, 24 Oct 77 (No copies furnished by DTIC).

No abstract available.

EFI-243(36)-77 PC **A02/MF A01**
Erevanskii Fizicheskii Inst. (USSR).
Excitation of Nonlinear Oscillations in Plasma by a Finite Electron Beam.
A. Ts. Amatuni, M. R. Magomedov, E. V. Sekhposyan, and S. S. Ehlbakyan. 1977, 14p
U.S. Sales Only.

The one-dimensional problem of exciting stationary nonlinear oscillations of finite amplitude in cold collisionless plasma by a finite electron beam, is considered. The dependence of the characteristics of longitudinal nonlinear oscillations on the beam parameters is studied. The connection between the longitudinal and transverse oscillations results in the solutions of the equation for velocity components being unstable due to the terms proportional to beta exp 2 (beta 11) for the transverse components in the equations. Under application of an external magnetic field the instability of the solution is not removed, though its character changes. (Atomindex citation 10:419371)

IA-1347 PC **A06/MF A01**
Israel Atomic Energy Commission, Yavne. Soreq Nuclear Research Center.
Investigation of the Interaction of High Intensity Laser Light with Solids and Hot Plasma Using X-Ray Spectroscopic Technique.
Thesis (Ph.D.),
A. Zigler. Jun 78, 110p
In Hebrew.
U.S. Sales Only.

This work investigates the properties of high power laser-produced plasmas by developing and applying x-ray spectroscopic methods which utilize spatial resolution. The shadow techniques which were developed in this work yield a high spatial resolution of 5-15 mu m together with an adequate X-ray spectral resolution for single shots of laser power flux of 2.10 exp 13 W/cm exp -2 . The intensity distribution in the source is calculated from the partial shadow by numerical differentiation. The main advantage of the present method is the ability to obtain spatial information simultaneously for strong and weak spectral lines for a single shot of medium power laser. Plasma parameters were derived from H-like and He-like lines and their inner-shell satellites, which were obtained from Mg, Al and Si targets. Using shadow techniques, the sizes of the emitting regions of the various spectral lines were measured; the spatial variation of the ionization stage, the electron temperature and density were investigated. A constant electron temperature of (250+-50)eV and electron density scalelength of about 50 mu m were derived for an expanding plasma. An experimental investigation of the possible origin and the mechanisms responsible for the Ksub(alpha) radiation in laser-produced plasma was carried out. It is shown that the Ksub(alpha) radiation was generated by fast suprathermal electrons and originated inside the target behind the interaction zone of the shock and heat waves. Energy penetration depth and hot plasma expansion were tested by using multilayer targets, thin foils and achieving a two-dimensional spatially resolved X-ray Al spectrum. (Atomindex citation 10:478196)

LA-UR-79-3396 PC **A02/MF A01**
Los Alamos Scientific Lab., NM.
Compact Torus Theory: MHD Equilibrium and Stability.
D. C. Barnes, C. E. Seyler, and D. V. Anderson. 1979, 6p CONF-791225-2
Contract W-7405-ENG-36
Symposium on compact toruses and energetic particle injection, Princeton, NJ, USA, 11 Dec 1979.

Field reversed theta pinches have demonstrated the production and confinement of compact toroidal configurations with surprisingly good MHD stability. In these observations, the plasma is either lost by diffusion or by the loss of the applied field or is disrupted by an n = 2 (where n is the toroidal mode number) rotating instability only after 30 to 100 MHD times, when the configuration begins to rotate rigidly above a critical speed. These experiments have led one to investigate the equilibrium, stability, and rotation of a very elongated, toroidally axisymmetric configuration with no toroidal field. Many of the above observations are explained by recent results of these investigations which are summarized. (ERA citation 05:010971)

LA-UR-79-3397 PC **A02/MF A01**
Los Alamos Scientific Lab., NM.
Relaxation of Toroidal Discharges.
L. Turner. 1979, 5p CONF-791225-3
Contract W-7405-ENG-36
Symposium on compact toruses and energetic particle injection, Princeton, NJ, USA, 11 Dec 1979.

The variational principle of Taylor provides the guiding spirit for calculations concerning the relaxation of turbulent plasma discharges. The principle states that a turbulent, high-magnetic-Reynolds-number plasma confined by a perfectly conducting shell will achieve the state of minimum magnetic energy consistent with specified magnetic helicity and magnetic flux. It yields the Euler equation vector V x vector B = lambda vector B where, for reversed-field pinch geometries, the eigenvalue lambda is a continuous variable that specifies the ratio of net toroidal current to net toroidal magnetic flux. Although this principle has not as yet received rigorous justification, it has been able to reproduce much of the gross experimental features of the British reversed-field pinch experiment ZETA. Some observations are described. (ERA citation 05:010972)

LA-8117-MS PC **A02/MF A01**
Los Alamos Scientific Lab., NM.
Ultra-Soft X-Ray Light Pipes for Space-, Time-, and Energy-Resolved Imaging of High-Density Plasmas.
C. A. Ekdahl. Nov 79, 21p
Contract W-7405-ENG-36

By use of the Ultra-Soft X-ray (USXR) analog of "light-pipes" it is possible to obtain space- and time-resolved measurements of plasma radiation in the high-energy region of the emission spectrum. Using fast analog-to-digital converters, computerized data acquisition and processing, and the techniques of computer-aided tomography, it is possible to reconstruct from these data the time evolution of a spatially distributed x-ray source. A conceptual design of an apparatus using USXR pipes for obtaining spatially resolved data from the ZT-40 toroidal pinch is described. The pipes also have the property of acting as a dispersing element, and a means of using this feature to obtain

information about the spectral properties of the plasma source is described. (ERA citation 05:010961)

NORDITA-78-8 PC **A05**/MF **A01**
Nordisk Inst. for Teoretisk Atomfysik, Copenhagen (Denmark).
Screening Properties of a Classical Two-Dimensional Coulomb Gas from the Sine-Gordon Equation.
G. Grinstein, P. Minnhagen, and A. Rosengren.
Apr 78, 89p
U.S. Sales Only.

The free energy and the static dielectric function at small wavevectors of a classical 2-D Coulomb gas (CG) is obtained for small densities through a fully microscopic calculation which utilizes the equivalence between the CG and the sine-Gordon (SG) equation. The existence of three distinct regions in the temperature-density (T, n) phase diagram of the CG at low densities is confirmed. In the high-temperature (metallic) region the CG is a fully ionised plasma. At lower temperatures an 'intermediate' region characterized by the co-existence of both charged particles and neutral molecular pairs occurs. At the temperature defining the boundary between the metallic and intermediate phases the CG dielectric function is obtained for all wavevectors through an analogy between the CG and a 1-D free fermion theory. Leading corrections to the low-density results given here are estimated. (Atomindex citation 10:477624)

N80-21154/3 PC **A11**/MF **A01**
Nagoya Univ. (Japan). Inst. of Plasma Physics.
Proceedings of USSR-Japan Joint Seminar on Plasma Diagnostics.
O. Pavlichenko, and J. Fujita. Jan 80, 228p IPPJ-438
Proc. Held at Nagoya, Japan, 13-17 Nov. 1979.

The development of high temperature plasma diagnostics suitable for nuclear fusion research is discussed with emphasis on diagnostics for the large JT-60 and T-15 Tokamaks. Recent results on the KhTI, the T-15, the JIPP T-2 stellarator/tokamak, the TORUIT-4, the TRIAM-1, and the DIVA/JFT-2a are reported. Topics covered include measuring nonstationary and anisotropic density fluctuations using electromagnetic wave scattering, the development of a twin optically-pumped far infrared CH3OH laser; SMM wave laser scattering apparatus for measuring waves and turbulences in Tokamak plasmas; the role of impurity spectra in tokamak devices; diagnosing dense plasmas with ruby laser holography; heavy ion beam probes for potential measurement; supersound plasma counter-streaming interaction and thermalization inside open magnetic traps; and the collision of high energy plasma streams.

N80-21156/8 PC **A02**/MF **A01**
Nagoya Univ. (Japan). Inst. of Plasma Physics.
Deflagration Wave Formed by Ion Beam. Part 3: With Energy of Direct Fusion Reaction.
K. Niu, T. Abe, and M. Tamba. Jan 80, 15p IPPJ-435-PT-3

The structure of the deflagration wave which is formed in a target bombarded by an ion beam was analyzed. Stationary deflagration and/or detonation waves are formed at the surface of the target in a case in which the reaction energy of direct fusion and/or the beam energy deposited in the target are less than a critical value. On the other hand, no solution for stationary wave exists, if the energy deposited in the wave exceeds a critical value. In the latter case, the time-dependent fundamental equations reduce approximately to a self-similar type of equations. Numerical integrations are carried out for this type of differential equations, and an example of self-similar deflagration wave numerically obtained is plotted in the figures.

N80-21157/6 PC **A03**/MF **A01**
Nagoya Univ. (Japan). Inst. of Plasma Physics.
Numerical Study of Current-Driven Collisional Drift and Alfven Instabilities in a Sheared Magnetic Field.
K. I. Nishikana. Jan 80, 34p IPPJ-436

A set of coupled eigenmode equations for drift and shear Alfven mode in a sheared magnetic field is solved numerically including effects of parallel current, the full ion dynamics and electron-ion collisions. Detailed studies are made on the eigenmode structures of both the modes and combined effects of current and finite-beta. An outstanding result is that the current-driven drift mode shows, at some moderate beta value, a peculiarity in dispersion and its eigenmode structure is deformed to a shape different from the usual one, which means the strong coupling of drift mode to shear Alfven mode due to the combined effects. In the most cases except this, the effects of finite-beta and collisions are found to be stabilizing.

PPPL-1625 PC **A02**/MF **A01**
Princeton Univ., NJ. Plasma Physics Lab.
Dissociative Excitation as the Source of Neutral Atoms in Hydrogen Discharges.
D. H. McNeill. Jan 80, 20p
Contract EY-76-C-02-3073

Electron impact dissociative excitation of H sub 2 molecules is identified as the origin of the narrow width and structure of Balmer lines observed in various low density hydrogen discharges. On the basis of this data and estimates of the rates of competing processes in plasmas, dissociative excitation, together with other molecular reactions, is proposed as the source of neutral atoms and protons in these discharges. (ERA citation 05:012810)

SAI-254-79-933-LJ PC **A03**/MF **A01**
Science Applications, Inc., Boulder, CO. Plasma Research Inst.
Mode Coupling in a Toroidal, Sharp-Boundary Plasma. I. Weak-Coupling Limit.
D. A. D'Ippolito, and J. P. Goedbloed. Dec 79, 37p
Contract EY-76-C-03-1018

The phenomenon of mode coupling in the discrete Alfven wave spectrum of ideal magnetohydrodynamics is studied using a simplified plasma model. It is shown that mode coupling occurs when a periodic modulation of the equilibrium magnetic field strength and curvature is introduced, either by toroidicity or by noncircularity of the cross section. The existence of gaps in the frequency spectrum and the spatial localization of the eigenfunction as a result of mode coupling is analogous to the behavior of valence electrons in a one-dimensional crystal lattice. (ERA citation 05:012827)

TRITA-EPP-78-16 PC **A03**/MF **A01**
Royal Inst. of Tech., Stockholm (Sweden). Institutionen foer Plasmafysik.
Electron Temperature Measurements in Low Density Plasmas by Helium Spectroscopy II - Parameter Limits for Validity of Different Methods.
N. Brenning. Dec 78, 44p
U.S. Sales Only.

Different methods to measure electron temperature in low-density plasmas by He spectroscopy are examined. They are based either on the relative intensities of singlet and triplet lines or on the absolute intensities of single lines. Calculations from measured and theoretical data show that both methods are seriously influenced by secondary processes, the dominating being excitation from the metastable levels 2 exp 1 S and 2 exp 3 S, and excitation transfer in electron-atom collisions combined with imprisonment of resonance radiation. The calculations give parameter limits for validity of different methods and combinations of lines. Due to the secondary processes, T sub(e)-determination from relative line intensities is limited to low-density, short-duration plasmas (typically n sub(e) < 2.10 exp 16 m exp -3 , t sub(ex) < 5.10 exp -6 s) or to even lower densities that depend on the apparatus dimensions (typically n sub(e) < 3.10 exp 15 m exp -3 , L approximately 0.1 m). For T sub(e)-determination from absolute line intensities the situation is more favourable, and with a suitable choise of lines the restrictions on n sub(e) and t sub(ex) can be typically (n sub(e) < 5.10 exp 17 m exp -3 , t sub(ex) < 10 exp -5 s) or (n sub(e) < 10 exp 17 m exp -3 , L approximately 0.1 m) for electron temperatures above 10 eV. For temperatures below 10 eV and degrees of imprisonment below 7 % measurements are possible for electron densities up to 10 exp 19 or 10 exp 20 m exp -3 , and without any limits on t sub(ex) or L. (Atomindex citation 10:478002)

TRITA-PFU-79-04 PC **A02**/MF **A01**
Royal Inst. of Tech., Stockholm (Sweden).
Resonance and Cut-off Surfaces in the Ion Cyclotron Frequency Range in Toroidal Geometry.
T. Hellsten, and E. Tennfors. Mar 79, 17p
U.S. Sales Only.

Resonances and cut-offs of the fast Alfven and ion-cyclotron waves have been studied for a multi-component plasma in a toroidal axisymmetric geometry. The resonance and cut-off frequencies are given by eigenvalues of ordinary differential equations on the rosonance and cut-off sufaces, respectively. These surfaces coincide with magnetic surfaces. (Atomindex citation 10:478065)

UCID-18495 PC **A02**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Determination of the Radius of a Self-Pinched Beam from Its Energy Integral.
E. P. Lee. 2 Jan 80, 15p
Contract W-7405-ENG-48

The total transverse energy (kinetic plus potential) of a self-pinched beam may be used to predict the final equilibrium radius when the beam is mismatched at injection. The dependence of potential energy on the current profile shape is characterized by a dimensionless parameter C(z), variations of which are correlated with the change of emittance. (ERA citation 05:012820)

UCID-18525 PC **A02**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Drift Microwave Plasma Heating.
D. L. Ensley. 4 Oct 78, 17p
Contract W-7405-ENG-48

A self-consistent plasma simulation code has been used to simulate a hot (5 keV), overdense (approx. 10 exp 4), microwave-corona interaction for a hydrogen plasma. (ERA citation 05:012807)

UCRL-83095 PC **A02**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Pulsed Calibration of the Soft X-Ray Streak Camera.
R. L. Kauffman, H. Medecki, and E. L. Pierce.
Nov 79, 17p CONF-791135-6
Contract W-7405-ENG-48
21. annual meeting of the American Physical Society, Boston, MA, USA, 12 Nov 1979.

In order to better understand laser plasma interactions an effort is being made to obtain quantitative temporally and spectrally resolved measurements in the low energy x-ray region using a soft x-ray streak camera. X-ray mirrors and absorption filters are employed to perform broad band spectroscopy measurements. The components of these systems have now been calibrated and the results of these measurements will be reported. The calibration of the x-ray streak camera, needed to make absolute flux measurements, cannot be measured using the usual x-ray sources because backgrounds interfere with the operation in the D.C. mode. Repetition rates and duty cycles are too low to complete calibration on a D.C. source in a reasonable time using the camera in a pulsed mode. As an alternative the calibrations are being done using a Nd(YAG) laser producing pulses of approx. 1 joule having pulse widths of approx. 150 ps. The x-ray flux is being monitored by three x-ray diodes having Al photocathodes. Absorption filters having the same thicknesses as those used with the streak camera provide x-ray energy responses of the diodes which approximate the channel responses of the streak camera. By comparing the charge from the diode with the integral response of the streak camera, the camera response can be measured. Preliminary results will be discussed. (ERA citation 05:012369)

20J. Quantum Theory

AD-A082 478/9 PC **A02**/MF **A01**
Rome Air Development Center Hanscom AFB MA Deputy for Electronic Technology
Simplified Formulae for Solitons in Media with Slowly Varying Inhomogeneity.
Peter D. Gianino, and Bernard Bendow. 27 Feb 79, 4p Rept no. RADC/ETR-80-0004

Pub. in the Physics of Fluids, v23 n1 p220-221 Jan 80.

No abstract available.

BONN-HE-78-9 PC **A03**/MF **A01**
Bonn Univ. (Germany, F.R.). Physikalisches Inst.
Moufang Plane and Octonionic Quantum Mechanics.
M. Guenaydin. May 78, 28p
U.S. Sales Only.

In this talk I am going to present a projective geometric formulation of the octonionic quantum mechanics corresponding to the so-called Moufang plane. (Atomindex citation 10:419418)

BONN-HE-79-7 PC **A02**/MF **A01**
Bonn Univ. (Germany, F.R.). Physikalisches Inst.
Relativity and Quantum Theory in Limericks.
A. V. Lagu. Apr 79, 13p
U.S. Sales Only.

Populaerwissenschaftliche Einfuehrung in die Relativitaets- und Quantentheorie mit Hilfe von Limericks. (Atomindex citation 10:474476)

CBPF-A0003/78 PC **A02**/MF **A01**
Centro Brasileiro de Pesquisas Fisicas, Rio de Janeiro.
General Relativistic Non-Linear Field. A Kink Solution in a Schwarzschild Geometry.
T. Kodama. Jan 78, 16p
U.S. Sales Only.

A time-independent spherically symmetric solution of a general relativistic nonlinear field equation is obtained. It is shown that the nonlinear negative energy scalar field has a localized solution with a positive mass. It can be regarded as a 3-dimensional extension of the usual kink solution on the Schwarzschild geometry, connecting the two vacuum states from one asymptotically flat space to the other through the Rosen-Einstein bridge. (Atomindex citation 09:392688)

IC-77-145 PC **A02**/MF **A01**
International Centre for Theoretical Physics, Trieste (Italy).
Relativistic Fluids in Spherically Symmetric Space.
R. Dipankar. Dec 77, 12p
U.S. Sales Only.

Some of McVittie and Wiltshire's (1977) solutions of Walker's (1935) isotropy conditions for relativistic perfect fluid spheres are generalized. Solutions are spherically symmetric and conformally flat. (Atomindex citation 09:415157)

IC-77-148 PC **A02**/MF **A01**
International Centre for Theoretical Physics, Trieste (Italy).
Strong Gravity and Supersymmetry.
A. H. Chamseddine, A. Salam, and J. Strathdee. Nov 77, 12p
U.S. Sales Only.

A supersymmetric theory is constructed for a strong f plus a weak g graviton, together with their accompanying massive gravitinos, by gauging the gradel 0Sp(2,2,1)x 0Sp(2,2,1) structure. The mixing term between f and g fields, which makes the strong graviton massive, can be introduced through a spontaneous symmetry-breaking mechanism implemented in this note by constructing a non-linear realization of the symmetry group. (Atomindex citation 09:415141)

IC-78-12 PC **A02**/MF **A01**
International Centre for Theoretical Physics, Trieste (Italy).
Remarks on High Energy Stability and Renormalizability of Gravity Theory.
A. Salam, and J. Strathdee. Feb 78, 12p
U.S. Sales Only.

Arguing that high-energy (Froissart) boundedness of gravitational cross-sections may make it necessary to supplement Einstein's Lagrangian with terms containing R exp 2 and Rsup(mu nu)Rsub(mu nu), criteria are suggested which, if satisfied, could make the tensor ghost in such a theory innocuous. (Atomindex citation 10:419471)

IC-78-2 PC **A02**/MF **A01**
International Centre for Theoretical Physics, Trieste (Italy).
Stability of the Strong Gravity Solution.
S. A. Baran. Jan 78, 15p
U.S. Sales Only.

The perturbation of the classical solution to a strong gravity model given by Salam and Strathdee is investigated. Using the Hamiltonian formalism it is shown that this static and spherically symmetric solution is stable under the odd parity perturbations provided some parameters in the solution are suitably restricted. (Atomindex citation 10:419382)

ITEF-18(1979) PC **A03**/MF **A01**
Gosudarstvennyi Komitet po Ispol'zovaniyu Atomnoi Energii SSSR, Moscow. Inst. Teoreticheskoi i Eksperimental'noi Fiziki.
Quantum Systems and Symmetrical Spaces of Nonpositive Curvature.
M. A. Ol'shanetskii, and A. M. Perelomov. 1979, 44p
In Russian.
U.S. Sales Only.

A certain class of quantum systems hamiltonians of which are related to invariant operators on symmetrical spaces is studied. Owing to this a number of physical facts is established. Within the classical limit the earlier considered fully integrated systems related to root systems are obtained. (Atomindex citation 10:477664)

ITEP-132(1978) PC **A04**/MF **A01**
Gosudarstvennyi Komitet po Ispol'zovaniyu Atomnoi Energii SSSR, Moscow. Inst. Teoreticheskoi i Eksperimental'noi Fiziki.
Quantum Systems and Symmetric Spaces.
M. A. Olshanetskii, and A. M. Perelomov. 1978, 53p
U.S. Sales Only.

A certain class of quantum systems with Hamiltonians related to invariant operators on symmetric spaces has been investigated. A number of physical facts have been derived as a consequence. In the classical limit completely integrable systems related to root systems are obtained. (Atomindex citation 10:474496)

ITEP-155(1978) PC **A02**/MF **A01**
Gosudarstvennyi Komitet po Ispol'zovaniyu Atomnoi Energii SSSR, Moscow. Inst. Teoreticheskoi i Eksperimental'noi Fiziki.
Gelfand-Dikii Hamiltonian Operator and Co-adjoint Representation of the Volterra Group.
D. R. Lebedev, and Yu. I. Manin. 1978, 15p
U.S. Sales Only.

It is shown that the Gelfand-Dikii Hamiltonian structure is an analogue of a very special class of finite-dimensional symplectic structures, namely, the Kirillow structures on the orbits of the co-adjoint representation of the Lie groups. The Lie group is represented by the Volterra operators. The main interest lies in the possibility of application of the ideology of "geometric quantization" to the Lax equations. (Atomindex citation 10:467081)

ITEP-156(1978) PC **A02**/MF **A01**
Gosudarstvennyi Komitet po Ispol'zovaniyu Atomnoi Energii SSSR, Moscow. Inst. Teoreticheskoi i Eksperimental'noi Fiziki.
Group-Theoretical Interpretation of the Korteweg-de Vries Type Equations.
F. A. Berezin, and A. M. Perelomov. 1978, 22p
U.S. Sales Only.

The Korteweg-de Vries equation is studied within the group-theoretical framework. Analogous equations are obtained for which the many-dimensional Schroedinger equation (with nonlocal potential) plays the same role as the one-dimensional Schroedinger equation does in the theory of the Korteweg-de Vries equation. (Atomindex citation 10:477585)

ITEP-170(1978) PC **A03**/MF **A01**
Gosudarstvennyi Komitet po Ispol'zovaniyu Atomnoi Energii SSSR, Moscow. Inst. Teoreticheskoi i Eksperimental'noi Fiziki.
Stability of the Three-Dimensional Solitons.
Yu. A. Simonov. 1978, 49p
U.S. Sales Only.

The complex time-dependent solutions of the first order in deltasub(t) (nonrelativistic) and second order (relativistic) nonlinear local or nonlocal equations have the conserving normalization (nonrelativistic case) or charge (relativistic case). These conservation laws stipulate the nonvalidity (in general) of the Hobbart-Derrick theorem and a possibility of having stable soliton solutions to these nonlinear equations if the nonlinear interactions obey certain conditions. These conditions are formulated for relativistic and nonrelativistic equations with both local and nonlocal interactions and for systems of the relativistic equations. In the relativistic case there exist two critical values of the frequency, omega sub(b) and omega sub(c), such that the solitons are stable for small or finite perturbations if omega > omega sub(b) and omega > omega sub(c) respectively. The values of omega sub(b) and omega sub(c), explicitly calculated for the cubic plus fifth power nonlinearity, are in agreement with the results of numerical solution. (Atomindex citation 10:467126)

JINR-E-2-11169 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Theoretical Physics.
Matrix and Analytic Representations of Quaternions and Octonions. 1. Pt.
I. V. Polubarinov. 1978, 22p
U.S. Sales Only.

For quaternions (Pauli spin 1/2 matrices) and octonions (there are some attempts to explain quark structure, using the latter) matrix and analytic representations (in the sense of the Dirac representation theory) are constructed. They are applicable to the density matrix formalism. The octonion 8x8 matrices satisfy a modified (with respect to the octonion algebra) associative algebra. The analytic representations are similar to the Wigner and coherent state representations in usual quantum mechanics. As a model, a simplest case of octonion quantum mechanics (but not exceptional one) is formulated, including equations of motion for density operator and "observables". At first, it is written directly in terms of octonions and then is transformed into the representations under consideration. (Atomindex citation 10:419460)

JINR-E-2-11179 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR).
Remarks Concerning Nonrelativistic Lorentz-Dirac Equation.
G. N. Afanasiev, and V. P. Schpakov. 1978, 19p
U.S. Sales Only.

Reasons for the nonphysical solutions of the nonrelativistic Lorentz-Dirac equation are examined. It is shown that these are due to the reversible radiation energy losses. The source of those losses is the infinite mass of the point electron. The lorentz-Dirac one-dimensional equation for the Coulomb external force is analyzed. It is shown that the nonphysical character of the solutions obtained is due to the point electron structure, but not to the singularity of the external Coulomb force. The extension of the electron is taken into account using the well-known Herglotz method, which for the oscillator force allows the analytical solution. There are only physical damping solutions in this case. For special values of the oscillator constant stationary radiationless motions are possible. In this case the energy becomes an approximate integral of the motion and takes discrete values. (Atomindex citation 10:419368)

JINR-E-2-11388 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Theoretical Physics.
Investigation of Spontaneously Broken Gauge Theories. 3. Three- and Four-Point Functions and Renormalization Constants.
T. Nagy. 1978, 12p
U.S. Sales Only.

The fermion-boson three-point functions of a general spontaneously broken gauge theory (SBGT) are calculated in one-loop approximation. They satisfy the corresponding Ward-Takakhashi identities. It is checked that the gauge invariant counterterms introduced earlier make the theory finite and the renormalization constants and mass counterterms are given by using 't Hooft's prescription. (Atomindex citation 10:467094)

JINR-E-2-11394 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Theoretical Physics.
Completely Integrable Hamiltonian Systems, Connected with the Non-Self-Adjoint Dirac Operator.
V. S. Gerdjikov, and P. P. Kulish. 1978, 22p
U.S. Sales Only.

The non-self-adjoint one-dimensional Dirac operator is considered, which involves the complex-valued functions q(x) and p(x) which satisfy the conditions q(x) implies qsub(+-), p(x) implies psub(+-) when x implies +- infinity, qsub(+)psub(+)=qsub(-)psub(-). The direct and the inverse scattering problems for the operator L are solved, provided that the discrete spectrum of the operator L is finite and simple. Using the corresponding trace identities a class of infinite dimensional Hamiltonian systems is described, for which the action-angle variables are calculated. (Atomindex citation 10:467047)

JINR-E-2-11757 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Theoretical Physics.
Two-Loop Renormalization of the QCD in an Arbitrary Gauge.
Ed. Egorian, and O. V. Tarasov. 1978, 12p
U.S. Sales Only.

The Gell-Mann-Low function and anomalous dimensions of vector, quark and ghost propagators are calculated at the two-loop level for an arbitrary gauge parameter in QCD. SU(n) group is taken as a colour-gauge group. The asymptotics of the effective parameters and propagators are discussed. (Atomindex citation 10:467035)

JINR-E-2-11780 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Theoretical Physics.
Covariant Formulation of the Relativistic Hamiltonian Theory on the Light Cone (Fields with Spin).
N. M. Atakishiev, R. M. Mir-Kasimov, and Sh. M. Nagiyev. 1978, 18p
U.S. Sales Only.

A Hamiltonian formulation of quantum field theory on the light cone, developed earlier, is extended to the case of particles with spin. The singularities accompanying each field theory in light-front variables are removed by the introduction of an infinite number of counterterms of a new type, which can be included into the interaction Hamiltonian. A three-dimensional diagram technique is formulated, which is applied to calculate the fermion self-energy in the lowest order of perturbation theory. (Atomindex citation 10:467008)

JINR-E-2-11930 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Theoretical Physics.
Certain Fock Type Representation of the Lie Superalgebra A(0.1).
T. D. Palev. 1978, 13p
U.S. Sales Only.

A Fock space of two pairs of generalized creation and annihilation operators is constructed. These operators belong to the odd part of the Lie superalgebra A(0.1) and generate the whole algebra. The creation and annihilation operators define in the Fock space an infinite-dimensional irreducible representation of the algebra A. (Atomindex citation 10:467104)

JINR-E-2-11942 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Theoretical Physics.
A-Superquantization.
T. D. Palev. 1978, 17p
U.S. Sales Only.

A quantization of tensor fields is studied with creation and annihilation operators that belong to the odd part of the special linear superalgebra and generate the whole algebra. The properties of the lowest nontrivial Fock space are investigated. For this case the Pauli principle has been formulated. The charge of every ensemble of particles is either 0 or 1. An orthonormalized basis in the Fock space is constructed. The matrix elements of the creation and annihilation operators are found. (Atomindex citation 10:467105)

JINR-E-2-11950 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Theoretical Physics.
Supersymmetric Solitons and Monopoles.
J. Hruby. 1978, 19p
U.S. Sales Only.

The basic results in a new trend in supersymmetry and soliton theory are presented. It is shown that the soliton expectation value of the energy operator is mass of the soliton without the quantum corrections. A new supersymmetric monopole model in three dimensions is constructed by generalization of the supersymmetric sine-Gordon model in one space dimension. (Atomindex citation 10:467070)

JINR-E-2-12100 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Theoretical Physics.
Bounded Energy Approximation to an Unstable Quantum System.
P. Exner. 1979, 19p
U.S. Sales Only.

An approximation using the so-called bounded energy states is studied within the framework of general kinematical concept of unstable quantum systems. Approximations of a clear physical meaning are obtained for the state space, reduced evolution operator, decay laws and other characteristics of the unstable system. The results show that the well-known troubles with the Weisskopf-Wigner semigroup condition are not essential. (Atomindex citation 10:474442)

JINR-E-5-11668 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Computing Techniques and Automation.
Expansion over the Products of Solutions of Two Dirac Systems.
V. S. Gerdjikov, and E. Kh. Khristov. 1978, 19p
U.S. Sales Only.

Using the contour integration method we obtain inversion formulae for the expansion of the vector-function h(x) over the products of solutions of two canonical Dirac systems, provided their coefficients fall off fast enough as alpha x alpha implies infinity. For simplicity we assume that their discrete spectra consist only of a finite number of simple non-real eigenvalues. (Atomindex citation 10:474451)

NORDITA-78-24 PC **A02**/MF **A01**
Nordisk Inst. for Teoretisk Atomfysik, Copenhagen (Denmark).
Coincidence-Limit Method Derivation of Anomalies.
N. K. Nielsen. Jul 78, 19p
U.S. Sales Only.

The coincidence-limit method in connection with zeta-function regularization is used to derive trace anomalies and axial anomalies for arbitrary fields in curved space. (Atomindex citation 10:477660)

PB80-171168 Not available NTIS
National Bureau of Standards, Washington, DC.
Sum Rule and Classical Limit for Scattering in a Low-Frequency Laser Field.
Final rept.,
L. Rosenberg. Oct 79, 7p
Sponsored in part by National Science Foundation, Washington, DC.
Pub. in Physics Review A 20, n4, p1352-1358, Oct 79.

A previously derived low-frequency approximation for scattering in a laser field represents the amplitude for scattering with the absorption of emission of a specified number of photons in terms of the physical field-free scattering amplitude, a result which holds even with the inclusion of a correction term of first order in the frequency of the field. In the general case, where the polarization of the field is arbitrary and the dipole approximation is not assumed, the cross section depends on the phase as well as the magnitude of the field-free scattering amplitude. It is shown here that this phase dependence disappears when the cross section is summed over all possible final states of the field. The result of this summation is identical (within the limits set by the domain of validity of the low-frequency approximation itself) to that which would be predicted from a classical description of the motion of the electron in the field, the collision taking place instantaneously and without influence from the field. This sum rule and its classical interpretation, obtained here in a nonrelativistic potential scattering model, is of the form derived some time ago by Brown and Goble on the basis of general field-theoretic considerations.

20K. Solid Mechanics

AD-A082 436/7 PC **A03**/MF **A01**
National Research Council of Canada Ottawa (Ontario) Div of Mechanical Engineering
Dynamics of Multi-Body Systems (Dynamiques des Systemes de Plusieurs Corps),
I. H. Mufti. Nov 79, 30p DME-MK-29, NRC-18017

The dynamic equations of multi-body systems in the form of open chains are derived by applying the principles of linear and angular momentum to each individual member in the chain. This results in the appearance of constraint forces and torques in the dynamic equations. Using more or less classical approach these unknown forces and torques can be eliminated. Another approach is to approximate these forces by elastic and viscous forces by allowing small violations of the constraints. The well-known elimination procedure leads to a small densely coupled system of equations while the lesser-known procedure of approximating the constraint forces and torques yields a large but less densely coupled system. Both these procedures are first explained in the context of a single rigid body and then applied to a system of rigid bodies in an open chain where each body is coupled directly to at most two neighbours. (Author)

AD-A082 518/2 PC **A02**/MF **A01**
David W Taylor Naval Ship Research and Development Center Bethesda MD Computation Mathematics/Logistics Dept
Constrained Optimization of Hole Shapes in Plate Structures.
Interim rept. Jun 79-Jan 80,
S. K. Dhir. Feb 80, 21p Rept no. DTNSRDC/CMLD-80/02

An analytical/numerical procedure has been developed which yields the optimum geometry for a constrained hole shape in a large plate under prescribed boundary stresses at infinity. The optimality criterion is based on the minimization of a certain stress integral taken around the hole boundary. Muskhelishvili's method is used to first obtain the symbolic stress expressions for a given mapping function with unknown coefficients. These stress expressions are then squared and integrated around the hole boundary to obtain the stress integral. The squaring prevents any cancellation of compressive and tensile stresses during the integration process and thus produces a more meaningful integral. A sample problem is worked out in detail to demonstrate this procedure. The optimum shape of a square-like (double barrel shape) hole with rounded corners was determined by restricting the mapping function to only one specific unknown coefficient. Modification of this shape by introduction of an additional term is also discussed. Numerical stress concentration values for this case are compared with those from other sources.

AD-A082 524/0 PC **A07**/MF **A01**
Pennsylvania State Univ University Park Applied Research Lab
Vibration of Cylindrical Shells, with and Without Ring Stiffening.
Technical memo.,
Eugene C. Eichelberger, Jr. 11 Jan 80, 141p
Rept no. ARL/PSU/TM-80-03
Contract N00024-79-C-6043
Master's thesis.

The dynamical response of two cylindrical shells, one with and one without ring-stiffening, was investigated. The driving-point admittance was measured and compared with predictions using the Mean-Value Admittance Method. This method predicts the geometric mean of the response of a vibrator with respect to frequency and is useful in understanding the behavior of many complex structures. The basic computations involve the mode functions, mode masses, and the mode density. The measurements were in good agreement

with the theory, and demonstrate that the Mean-Value Admittance Method is a practical means of predicting the vibrational response of shell structures to point excitation. (Author)

AD-A082 762/6 PC **A04/MF A01**
Cincinnati Univ OH Dept of Engineering Science
Multi-Body Dynamics Including the Effects of Flexibility and Compliance.
Technical rept. 30 Sep 78-29 Feb 80,
Ronald L. Huston. 1 Apr 80, 61p Rept no. UC-ES-040180-8-ONR
Contract N00014-76-C-0139

New and recently developed concepts and ideas useful in obtaining efficient computer algorithms for solving the equations of motion of multi-body mechanical systems with flexible links are presented and discussed. These ideas include the use of Euler parameters, Lagrange's form of d'Alembert's principle, generalized speeds, quasi-coordinates, relative coordinates, structural analysis techniques and body connection arrays. The mechanical systems considered are linked bodies forming a tree structure, but with no closed loops permitted. An explicit formulation of the equations of motion is presented. (Author)

AD-A082 863/2 Not available NTIS
Mcgill Univ Montreal (Quebec) Dept of Electrical Engineering
Finite Difference Analysis of Rayleigh Wave Scattering at Vertical Discontinuities,
M. Munasinghe, and G. W. Farnell. 16 May 72, 13p DRB-REPRINT-4034
Availability: Pub. in Jnl. of Geophysical Research, v78 n14 p2454-2466, 10 May 73 (No copies furnished by DTIC).

No abstract available.

AD-A082 895/4 Not available NTIS
Army Research and Technology Labs Moffett Field CA
Vibration and Response of Nonuniform Rotating Beams with Discontinuities,
Dewey H. Hodges. 1979, 9p
Presented at the AIAA, ASME, ASCE, AHS Structures, Structural Dynamics, and Materials Conference (20th), St. Louis, MO, 4-6 Apr 79.
Availability: Pub. in Jnl. of the American Helicopter Society, p43-50 Oct 79 (No copies furnished by DTIC).

No abstract available.

LA-8138-MS PC **A04/MF A01**
Los Alamos Scientific Lab., NM.
Finite Element Model for Nonlinear Shells of Revolution.
W. A. Cook. Nov 79, 54p
Contract W-7405-ENG-36

A finite element model for symmetrically loaded shells of revolution is described. The nonlinear geometric effects are accounted for by incrementing loads and iterating for equilibrium. The iteration process also allows for nonlinear materials. The shell model accounts for large strains, large rotations, and shear deformation. Three example problems demonstrate the versatility and accuracy of this model. An axially loaded cylinder and an internally pressurized spherical shell have large membrane strains, whereas a cylinder that deforms into a spherical shape has large rotations. (ERA citation 05:008971)

20L. Solid-State Physics

AD-A082 435/9 PC **A05/MF A01**
Belfer Graduate School of Science New York
Systematic Study of Pyroelectricity. Applications of Pyroelectric Materials.
Final technical rept. 1 Oct 75-31 Mar 77,
M. I. Bell, and Y. H. Tsuo. Jul 79, 78p DELET-TR-76-1342-F
Contract DAAB07-76-C-1342
Continuation of Contract DAAB07-74-C-0470.

Full accounts are given of theoretical and experimental studies of ferroelectric phase transitions begun under a previous contract and completed under the present one. The findings of these studies are applied to the analysis of several applications of pyroelectric materials and to the evaluation of the suitability of various ferroelectrics for these uses. A major result is that improper ferroelectrics, in which the polarization is not the order parameter, are predicted to have performance superior to that of proper ferroelectrics in both infrared imaging and thermal-to-electrical energy conversion applications. Experimental evidence is presented supporting this conclusion in the case of the pyroelectric vidicon. (Author)

AD-A082 476/3 PC **A02/MF A01**
Stanford Univ CA Edward L Ginzton Lab
Electron Beam Coevaporation of Superconducting A15 Nb-Si,
R. D. Feldman, R. H. Hammond, and T. H. Geballe. 23 Jul 79, 5p GL-3005, AFOSR-TR-80-0152
Contract F49620-78-C-0009
Pub. in Applied Physics Letter, v35 n10 p818-821, 15 Nov 79.

No abstract available.

AD-A082 477/1 PC **A02/MF A01**
Stanford Univ CA Dept of Applied Physics
Interface Superconductivity in CuCl,
T. H. Geballe, and C. W. Chu. 10 Apr 79, 13p AFOSR-TR-80-0156
Contract F49620-78-C-0009
Pub. in Comments on Solid State Physics, v9 n4 p115-126 1979. Prepared in cooperation with Houston Univ., TX, Grant NSF-DMR77-23204.

No abstract available.

AD-A082 499/5 PC **A02/MF A01**
Rensselaer Polytechnic Inst Troy NY Dept of Electrical and Systems Engineering
Nondestructive Evaluation of Semiconductor Surfaces Using the Surface Acoustic Wave Convolver,
H. Gilboa, K. Varahramyan, R. T. Webster, and P. Das. 1979, 8p AFOSR-TR-80-0155
Contract N00014-75-C-0722, Grant AFOSR-77-3426
Pub. in IEEE p284-289 1979.

No abstract available.

AD-A082 500/0 PC **A02/MF A01**
Rensselaer Polytechnic Inst Troy NY Dept of Electrical and Systems Engineering
Transverse Acoustoelectric Voltage (TAV) Spectroscopy of Gallium Phosphide, Indium Arsenide and Cadmium Sulphide-Nickel Chloride,
P. Das. 20 Feb 79, 6p AFOSR-TR-80-0157
Contract N00014-75-C-0772, Grant AFOSR-77-3426
Pub. in Jnl. of Vacuum Science and Technology, v16 n5 p1379-1382 Sep/Oct 79.

No abstract available.

AD-A082 552/1 PC **A03/MF A01**
Hughes Research Labs Malibu CA
Optical-Microwave Interactions in Semiconductor Devices.
Quarterly rept. no. 6, 1 Oct-31 Dec 79,
L. Figueroa, C. Slayman, and H. W. Yen. Feb 80, 26p
Contract N00173-78-C-0192

GaAs FETs with built-in optical waveguides are being developed. The purpose is to allow optical signals to be coupled into the active region of the devices efficiently. These FETs will be useful for optical mixing, optical injection locking, and optical detection purposes. (Author)

AD-A082 599/2 Not available NTIS
State Univ of New York At Albany Dept of Physics
Infrared Absorption of Silicon Irradiated by Protons,
Nikolai N. Gerasimenko, M. Rolle, Li-Jen Cheng, Young Hoon Lee, and John C. Corelli. 20 Jul 78, 8p
Contract N00014-75-C-0919, Grant NSF-DMR73-D2344
Availability: Pub. in Physica Status Solidi (b) v90 p689-695 1978 (No copies furnished by DTIC).

No abstract available.

AD-A082 602/4 PC **A02/MF A01**
Rensselaer Polytechnic Inst Troy NY Dept of Mechanical Engineering Aeronautical Engineering and Mechanics
Viscoplasticity Based on Total Strain. The Modelling of Creep with Special Considerations of Initial Strain and Aging,
Erhard Krempl. 4 May 79, 8p Rept no. RPI-CS-79-2
Contract N00014-76-C-0231
Pub. in Jnl. of Engineering Materials and Technology, v101 p380-386 Oct 79.

No abstract available.

AD-A082 629/7 PC **A02/MF A01**
Trinity Coll Dublin (Ireland)
Optical Detection of Magnetic Resonance in Semiconductors.
Final rept. Mar 79-Jan 80,
Brian Henderson. Jan 80, 16p
Grant DA-ERO-79-G0028

This report describes work on compound semiconductors using spin sensitive optical polarization and photoconductivity. Since the grant was awarded in February 1979 the spectrometer has been redesigned to give greater versatility and sensitivity. Some of the design features have been implemented and tested to show that theoretical advantages are indeed matched by experiment. The experiments so far attempted have been concerned with CdTe and GaAs:Cr. For CdTe, recombination luminescence following band gap excitation has been shown to be due to recombination processes involving donor states with g(D) = 1.61 and acceptors of g(A) = 1.35. The spectral dependence of these resonances show that the recombination is complex involving excitons trapped at neutral donors and neutral acceptors as well as holes trapped at neutral donors. The advantage of applying spin sensitive photoconductivity is readily apparent in experiments using band gap excitation in CdTe. When used for semi-insulating GaAs:Cr one remarkably observes the (5)T(2) ground state resonance even when excited with photons of energy less than one half the band gap energy. In fact spectral dependence of this resonance shows most of the sharp vibronic features of the (5)T(2) to (5)A(2) absorption band. (Author)

AD-A082 632/1 PC **A02/MF A01**
California Univ Berkeley Electronics Research Lab
Research in the Development of Thin-Film Devices and in the Study of Device Physics for Optical Communications and Optical Electronics.
Final rept. 15 Nov 73-14 Nov 79,
S. Wang. 1979, 18p ARO-11833.34-EL, ARO-14621.23-EL
Grants DAHC04-74-G-0070, DAAG29-77-G-0053

Our research effort is reviewed in four basic areas: (1) experimenting with new laser structures for providing two-dimensional waveguiding to control lateral modes, (2) investigating suitable waveguiding structures for use as the building block for future monolithic integration of optical components based on GaAs technology, (3) developing technologies related to material aspects for GaAs and related semiconductors, such as oxide formation and LPE growth of quaternary compounds, and (4) studying and demonstrating the use of Ti-diffused LiNbO3 waveguides in integrated-optics applications as modulators and power dividers.

AD-A082 848/3 PC **A02/MF A01**
Princeton Univ NJ Joseph Henry Labs of Physics
A Theory of Glassy Semiconductors.
Technical rept. for 1979,
D. C. Licciardello. 1 Apr 80, 16p
Contract N00014-77-C-0711

A model for glassy semiconductors is discussed which provides for a generic description of a wide range of materials. The theory is based on the premise that the under lying disorder of the amorphous state requires a qualitatively different description. The major consequence of the lack of long-range structural symmetry is the enhancement of the electron-phonon interaction and the localization of eigenstates. Strong enough interaction leads to an effective attraction between localized electrons which accounts for both diamagnetism and optical transparency. The excitations on

the ground state are derived and consideration of their relaxation leads to the existence of long lived states in a narrow region of the spectrum near the Fermi level. (Author)

AD-A082 878/0 PC **A02/MF A01**
Air Force Wright Aeronautical Labs Wright-Patterson AFB OH
Study of the Properties of GaAs-Anodic Al2O3 Interfaces.
Rept. for Jan 76-Jan 79,
B. Bayraktaroglu, F. L. Schuermeyer, and J. T. Grant. 22 Feb 79, 6p Rept no. AFWAL-TR-80-1053
Pub. in Jnl. of Vacuum Science and Technology, v16 n5 p1483-1486 Sep-Oct 79.

No abstract available.

AD-A082 906/9 Not available NTIS
Toronto Univ (Ontario) Dept of Electrical Engineering
A Simplified Method of Measuring Lifetime Using Steady-State Back Illumination of an MOS Capacitor,
C. St. L. Rhodes, and C. A. T. Salama. 22 Jan 74, 4p DRB-REPRINT-4037
Availability: Pub. in Jnl. of Electrochemical Society, v121 n9 p1219-1222 Sep 74 (No copies furnished by DTIC).

No abstract available.

AD-A082 907/7 Not available NTIS
Manitoba Univ Winnipeg Materials Research Lab
Effects of Temperature on Current Instabilities Caused by Recombination Centers in Semiconductors,
A. R. Elsharkawi, and K. C. Kao. 22 May 72, 8p DRB-REPRINT-4063
Availability: Pub. in Solid-State Electronics, v16 p1355-1361 1973 (No copies furnished by DTIC).

No abstract available.

AD-A082 947/3 PC **A02/MF A01**
Massachusetts Inst of Tech Cambridge Research Lab of Electronics
Use of the Cluster-Bethe-Lattice Method in Surface Studies,
R. B. Laughlin, J. D. Joannopoulos, and D. J. Chadi. 10 Feb 79, 5p
Contract N00014-77-C-0132
Pub. in The Jnl. of Vacuum Science and Technology, v16 n5 p1327-1330 Sep-Oct 79.

No abstract available.

AD-A082 949/9 PC **A02/MF A01**
Massachusetts Inst of Tech Cambridge Research Lab of Electronics
Bulk Electronic Structure of SiO2,
R. B. Laughlin, J. D. Joannopoulos, and D. J. Chadi. 29 May 79, 12p
Contract N00014-77-C-0132
Pub. in Physical Review B, v20 n12 p5228-5237, 15 Dec 79.

No abstract available.

BNL-26960 PC **A03/MF A01**
Brookhaven National Lab., Upton, NY.
Many-Body Problem in One-Dimension.
V. J. Emery. Nov 79, 35p CONF-7909119-1
Contract EY-76-C-02-0016
Kyoto summer institute on physics of low dimensional systems, Kyoto, Japan, 7 Sep 1979.

This work attempts to give a qualitative feeling for the more important physical ideas involved with the study of many-body systems in one dimension, and considers a particular strong-coupling model. This model provides an excellent description of the chains of mercury ions in Hg/sub 3-delta/AsF sub 6 ; some of the predictions of the theory can be checked by x-ray and neutron diffraction. Much of the physics of nearly one-dimensional materials is concerned with understanding the possible types of phase transition that may take place, and establishing the conditions in which one or another will be predominant. The most significant feature of purely one-dimensional systems is the dominant effect of fluctuations. The paper is organized as follows: introduction; qualitative aspects of one-dimensional systems (general survey, mathematical model, qualitative discussion of strong coupling - strong attractive U, strong repulsive U, large V); strong coupling between parallel spins (independent spin systems, coupling between opposite spins); mercury chains; electrons with arbitrary coupling; boson representations of operators; and classical Coulomb gas. (ERA citation 05:014524)

BNL-27014 PC **A02/MF A01**
Brookhaven National Lab., Upton, NY.
Radiation Induced Color Center and Colloid Formation in Synthetic NaCl and Natural Rock Salt.
P. W. Levy, K. J. Swyler, and R. W. Klaffky. 1979, 15p CONF-7909101-3
Contract EY-76-C-02-0016
Europhysical topical conference on lattice defects in ionic crystals, Canterbury, UK, 17 Sep 1979.

F-center and colloid particle formation has been studied in synthetic NaCl and natural rock salt crystals with apparatus for making optical absorption measurements during irradiation. F-center and colloid formation are functions of temperature, dose, dose rate, strain applied prior to irradiation and numerous other factors. Many of the observed properties are in accord with the Jain-Lidiard theory for radiation induced F-center and colloid growth above room temperature. (ERA citation 05:013928)

DOE/ER/01198-1295 PC **A09/MF A01**
Illinois Univ. at Urbana-Champaign. Dept. of Physics.
Effect of Hydrostatic Pressure on the Ionic Conductivity of Some Crystals with the Fluorite Structure.
J. M. Oberschmidt. 1980, 180p
Contract EY-76-C-02-1198
Thesis.

The effect of hydrostatic pressure on the ionic conductivity of CaF sub 2 , SrF sub 2 , BaF sub 2 , CdF sub 2 , SrCl sub 2 , PbF sub 2 , PbCl sub 2 , PbBr sub 2 and PbI sub 2 was studied for pressures up to 0.6 GPa and temperatures up to near the melting point. The activation volumes for extrinsic vacancy motion were obtained from the effect of pressure on the conductivity of doped and oxygen contaminated samples. The formation volumes of intrinsic defects were calculated from measured activation volumes at high temperatures. The defect formation volumes are found to be uniformly small and consistent with the dominance of Frenkel defects in all cases except PbCl sub 2 and PbBr sub 2 , where large formation volumes were observed, indicating Schottky defects. High pressure phase transitions in PbF sub 2 , SrCl sub 2 and PbI sub 2 were observed by the change in sample resistance across the transition. Transition temperature and pressure data are presented for pressures to 0.55 GPa and temperatures to near the melting point in PbI sub 2 , to 850 exp 0 K for PbF sub 2 and to 1050 exp 0 K for SrCl sub 2 . The temperature dependence of the ionic conductivity was also studied in the above materials. Good agreement with published results was obtained except in the cases of PbCl sub 2 and PbBr sub 2 . (ERA citation 05:013925)

GA-A-15142 PC **A03/MF A01**
General Atomic Co., San Diego, CA.
Boundary Value Problems of the Circular Cylinders in the Strain-Gradient Theory of Linear Elasticity.
B. G. Kao. Nov 79, 43p
Contract AT03-76ET35300

Three boundary value problems in the strain-gradient theory of linear elasticity are solved for circular cylinders. They are the twisting of circular cylinder, uniformly pressuring of concentric circular cylinder, and pure-bending of simply connected cylinder. The comparisons of these solutions with the solutions in classical elasticity and in couple-stress theory reveal the differences in the stress fields as well as the apparent stress fields due to the influences of the strain-gradient. These aspects of the strain-gradient theory could be important in modeling the failure behavior of structural materials. (ERA citation 05:011904)

IC-77-118 PC **A02/MF A01**
International Centre for Theoretical Physics, Trieste (Italy).
Friedel-Type Oscillations in One-Dimensional Antiferromagnetic Insulators.
G. Baskaran. Sep 78, 10p
U.S. Sales Only.

An impurity spin in one-dimensional spin-half X-Y and antiferromagnetic Heisenberg models is shown to induce decaying spatial oscillations of magnetization for finite magnetic field. In zero field there are no oscillations but only decay. Since these systems can be described mathematically in terms of a degenerate gas of pseudo-fermions, their response to impurity perturbation is similar to the response of an electron gas to a localized static charge. (Atomindex citation 09:415383)

IC-77-136 PC **A02/MF A01**
International Centre for Theoretical Physics, Trieste (Italy).
Theory of Disordered Ising Chains.
I. Z. Kostadinov, I. V. Petrov, and Tc. Sariisky. Nov 77, 8p
U.S. Sales Only.

The disordered Ising chain is considered. It is shown that for zero magnetic field the replicas method of Edwards and Anderson is exact and requires a specific type of fluctuation of the interaction parameters, excluding the spin-glass state. Linear renormalization transformations considered here include the initial distribution of the interaction intensity and allow distinction of the different types of disorder. The transformations are applied to the dilute solution model of disorder. (Atomindex citation 09:415468)

ISM-256 PC **A02/MF A01**
Ames Lab., IA.
Magnetic Field Dependence of the Pair Potential in Inhomogeneous Superconductors.
D. K. Finnemore, and T. Y. Hsiang. 1979, 5p CONF-791151-2
Contract W-7405-ENG-82
Inhomogeneous superconductors conference, Berkeley Springs, WV, USA, 1 Nov 1979.

The depairing effects of an applied magnetic field have been studied for inhomogeneous superconductors by measuring the critical currents of SNS junctions. Critical currents are found to decrease exponentially with increasing H over 3 orders of magnitude change in I/sub c/. If the depairing parameter is taken to be alpha = D/sub N/eH/c, one finds a diffusivity of 0.22 m exp 2 s exp -1 which agrees with the value from resistivity to an accuracy of about 30%. (ERA citation 05:012798)

ISM-258 PC **A02/MF A01**
Ames Lab., IA.
Vortices in Superconducting Films.
J. R. Clem. 1979, 7p CONF-791151-1
Contract W-7405-ENG-82
Inhomogeneous superconductors conference, Berkeley Springs, WV, USA, 1 Nov 1979.

The local magnetic flux density and electrical current density generated by a vortex in a superconducting film is calculated approximately using an extension of Pearl's method. The results apply to arbitrary ratios of the film thickness to the penetration depth and reduce to Pearl's thin-film and semi-infinite results in the appropriate limits. In addition, the vanishing of the order parameter on the vortex axis is accounted for by a simple model which removes the London-model divergences of the flux density and supercurrent density and leads to a physically correct description in the vortex core. The results are then applied to a calculation of the interaction energy of vortex-vortex and vortex-anti-vortex pairs. (ERA citation 05:012796)

Juel-1508 PC **A04/MF A01**
Kernforschungsanlage Juelich G.m.b.H. (Germany, F.R.). Inst. fuer Festkoerperforschung.
Diffuse X-Ray Scattering on Frenkel Defects in Copper.
D. Martinsen. Jun 78, 63p
In German.Thesis.
U.S. Sales Only.

Using the method of diffuse X-ray scattering, the structure of self-interstitial atoms and the formation of vacancy clusters has been investigated. For this purpose, copper single crystals have been produced. A precise measurement of the diffuse

defect scattering in the region between the (200)- and (111)-reflection veveals the structure of the self-interstitial atom to be of a (100) dumb-bell type. A fit of model calculations to the experimental results in the region between the reflections and for low scattering angles gives the dumb-bell distance, relaxation volume as well as the change of resistivity per Frenkel-defect. Using low angle scattering, the formation of vacancy agglomerates has been investigated after annealing at higher temperatures T > 200 K. (Atomindex citation 09:415477)

LBL-9990 PC **A05**/MF **A01**
California Univ., Berkeley. Lawrence Berkeley Lab.
Model of the Recrystallization Mechanism of Amorphous Silicon Layers Created by Ion Implantation.
R. M. Drosd. Nov 79, 96p
Contract W-7405-ENG-48
Thesis.

The recrystallization behavior during annealing of thin films of amorphous (alpha) silicon, in contact with a single crystal silicon substrate (referred to as C), has been studied in the transmission electron microscope (TEM). The amorphous film is created during high dose phosphorus ion implantation at 100 keV. It was found that the crystal substrate orientation and the implantation temperature have dramatic effects on the recrystallizaton rate, and the defect microstructure produced during annealing. Specifically, (100) wafers implanted at 77 exp 0 K contain only a low density of dislocation loops, but when the same wafer is implanted at room temperature the dislocation density is increased drastically. (111) wafers, when implanted at 77 exp 0 K show a high density of microtwins, but as the implantation temperature is increased a gradual increase in the density of dislocation loops is observed along with a reduction of the microtwins. At an implantation temperature of about 100 exp 0 C both orientations give an identical defect microstructure when annealed, which is a dense tangle of dislocations. (ERA citation 05:012215)

NORDITA-78-16 PC **A04**/MF **A01**
Nordisk Inst. for Teoretisk Atomfysik, Copenhagen (Denmark).
Relaxation and Collective Motion in Superconductors: A Two-Fluid Description.
C. J. Pethick, and H. Smith. May 78, 69p
U.S. Sales Only.

A simple unified discussion of branch imbalance and gap relaxation in superconductors is presented. Both phenomena are treated within the framework of the ordinary Boltzmann equation, supplemented by the BSC gap equation. It is shown that the physics of the process commonly referred to as quasiparticle branch imbalance relaxation may be understood simply if one introduces a two-fluid model for the charge in the superconductor, and regards the process as one in which charge associated with the normal component is converted into charge associated with the superfluid. The exact solutions of the Boltzmann equation, which are valid near Tsub(c) are derived, and the effects of anisotropy are allowed for. The comparison between relaxation rates measured in the superfluid and those obtained from normal state measurements and calculations is discussed. A set of two-fluid hydrodynamic equations based on the two fluid model for the charge is derived and it is found that the current of charge associated with the normal component is not in general equal to the usual normal current. On the basis of these equations expressions are derived for the characteristic quasiparticle diffusion length near phase slip centres and for the frequency of the recently observed collective mode. The result is compared with those of both microscopic and phenomenological calculations. (Atomindex citation 10:478390)

N80-21182/4 PC **A05**/MF **A01**
Laboratoires d'Electronique et de Physique Appliquee, Limeil-Brevannes (France).
Compensation Mechanisms in GaAs. Study of Chrome and Oxygen in This Material and Their Influence in Obtaining Semi-Insulating GaAs Phenomenes de Compensation dans GaAs. Etude du Chrome et de l'Oxygene dans Ce Materiau et Consequences pour l'Obtention de GaAs Semi-Isolant.
Final Report.
G. M. Martin, A. Mitonnean, A. Mircea-roussel, A. Mircea, and J. P. Farges. Jun 79, 85p LEP-79/640.SME-645-C
Contract DGRST-77-7-0085
In French; English Annex.

Crystal ingots of doped GaAs were characterized using electrical and optical techniques in order to study the deep compensation mechanisms responsible for the materials semiinsulating qualities. The crystals were doped with varying amounts of oxygen and chromium. Hall effect measurements and results from optical transient current spectroscopic analysis were compared with diverse chemical analyses. The relationship of doping concentration on electron mobility in deep crystal layers and the electrical properties of this type of semiconductor material are discussed.

PB80-171119 Not available NTIS
National Bureau of Standards, Washington, DC.
Acoustic Matching of Superconducting Films to Substrates.
Final rept.,
S. B. Kaplan. 1979, 23p
Sponsored in part by National Research Council, Washington, DC., and Office of Naval Research, Washington, DC.
Pub. in Journal of Low Temperature Physics 37, nos. 3/4, p343-365 1979.

Acoustic mismatch theory is used to estimate phonon transmission coefficients for various superconductor/substrate interfaces. It is shown that the conventionally employed substrates offer the largest acoustic mismatch to many of the commonly studied superconductors, thereby leading to unnecessarily large phonon-trapping and other nonequilibrium effects. Most available experimental results are shown to be in reasonable agreement with the theoretical estimates.

PB80-171127 Not available NTIS
National Bureau of Standards, Washington, DC.
Alignment Effects on Implantation Profiles in Silicon.
Final rept.,
D. R. Myers, and R. G. Wilson. 1979, 9p
Sponsored in part by Defense Advanced Research Projects Agency, Arlington, VA.
Pub. in Proceedings of a Conference on Ion Beam Modification of Materials, Budapest, Hungary, September 4-8, 1978, p103-111 1979.

Ion implantation is commonly used for the fabrication of fine geometry semiconductor devices. The need for shallower active layers in these devices requires that the extent of ion channeling be minimized to reduce the formation of deeply penetrating tails in the dopant distribution. In this paper, ion channeling in silicon is experimentally examined for a range of ion atomic numbers and implant energies characteristic of semiconductor device fabrication.

PB80-171143 Not available NTIS
National Bureau of Standards, Washington, DC.
An Atomic Model of Strain Induced Martensitic Transformations.
Final rept.,
D. E. MacDonald. Mar 80, 6p
Sponsored in part by National Science Foundation, Washington, DC.
Pub. in Proceedings of the International Conference on Martensitic Transformations ICOMAT 1979, Cambridge, Massachusetts, June 24-29, 1979, p325-330, Massachusetts Institute of Technology, Cambridge, Mar 80.

A jellium model of the alkali metals applicable to finite deformation is employed in the determination of the uniaxial extensions and contractions which trigger the martensitic transformation (bcc yields fcc) and the reverse transformation. A Born stability criteria based on infinitesimal elasticity is used to detect the onset of the transformation during a homogeneous deformation along (001). The symmetry and lack of it between the (bcc yields fcc) transformation and its reverse is explained in terms of the effect of the deformation on the volume and structure dependent terms in the expressions for the effective elastic coefficients. The finite values found for the uniaxial strains necessary for the transformations substantiates the need for a model which can sustain such deformations.

PB80-171150 Not available NTIS
National Bureau of Standards, Washington, DC.
An Implantation Predeposition Technique for the Introduction of Deep-Level Chemical Impurities.
Final rept.,
D. R. Myers, R. Y. Koyama, and W. E. Phillips. 1979, 10p
Sponsored in part by Department of Energy, Washington, DC., and Defense Advanced Research Project Agency, Arlington, VA.
Pub. in Proceedings of a Conference on Ion Beam Modification of Materials, Budapest, Hungary, September 4-8, 1978, p439-448 1979.

The characterization of deep-level chemical impurity centers in semiconductors requires the controlled introduction of known impurities. A technique is described which employs ion implantation as a predeposition step for the introduction of deep-level chemical impurities into silicon, yet prevents implantation-related damage from interfering with the measured deep-level response of the implanted species. The utility and versatility of this method are demonstrated by its application to the characterization of sulfur defect centers in silicon.

RISO-358 PC **A05**/MF **A01**
Risoe National Lab., Roskilde (Denmark).
Theory of Anisotropic Magnets. Magnetic Properties of Rare Earth Metals and Compounds.
P. A. Lindgaard. Apr 78, 83p
U.S. Sales Only.

This report treats the theory of the magnetic properties of strongly anisotropic materials. The author describes a number of exact transformations of the crystal field and exchange Hamiltonian necessary for making it tractable by means of well-founded theoretical methods. The theory is given for spin excitations in systems with various ratios between the exchange and crystal field energies. The results obtained for the rare earth (RE) metals are specifically discussed. Evidence of a large two-ion anisotropy is pointed out in the excitation spectrum for Pr. However, the experimental data for the heavy REs are consistent with the assumption that the contribution from two-ion anisotropy is small for the heavy REs, and the form and magnitude cannot at present be determined with any certainty. The dominant features of the heavy RE can be understood on the basis of a single-ion anisotropy and an isotropic exchange interaction. This substantially simplifies the understanding of the heavy RE. The spin wave spectra of the heavy RE are analyzed and the deduced interatomic exchange interaction parameters are shown to obey de Gennes scaling and to decrease as the inverse distance cubed. This picture is used to describe the phase diagrams of binary RE alloys. It is shown that exchange polarization occurs for a radical such as CO sub 32- so that the spin densities at the O and C ions are antiparallel. Calculations of crystal field quenching of magnetic moments are also discussed. The influence of a weak anisotropy on the paramagnetic and critical neutron scattering line shape is discussed by using frequency moments. The author describes the first calculation ab initio of the RKKY interaction. (Atomindex citation 09:401172)

RL-78-074 PC **A03**/MF **A01**
Science Research Council, Chilton (England). Rutherford Lab.
Measurement of Magnetic Structure Factors.
J. B. Forsyth. 1978, 40p
U.S. Sales Only.

The subject is covered in sections, entitled: experimental methods (using unpolarized or polarized neutron diffraction); the polarized beam diffractometer (polarizing the incident beam, the control of neutron polarization, the diffractometer geometry, specimen environment - field and temperature, experiment control, multiple scattering, data processing); corrections and accuracy. (Atomindex citation 09:415426)

SAND-80-8201 PC **E01**/MF **E01**
Sandia Labs., Albuquerque, NM.
DIFFUSE: A Code to Calculate One-Dimensional Diffusion and Trapping.
M. I. Baskes. Jan 80, 20p
Contract EY-76-C-04-0789

This document is intended to briefly acquaint the reader with the computer code DIFFUSE. DIFFUSE may be used to calculate the one-dimensional diffusion, and trapping of atoms in a material under general initial, source, and boundary conditions. The document includes a description of the physical model, code input and output format, three typical sample problems and their output, a listing of the code, and the control cards needed to use DIFFUSE at Sandia Laboratories, Livermore. (ERA citation 05:012886)

UCRL-Trans-11518 PC **A02**/MF **A01**
Influence of Silicon on the Diffusion of Gold in Germanium.
I. N. Belokurova, V. S. Zemokhov, and V. A. Klochko. Oct 79, 8p
Contract W-7405-ENG-48
A Issled. Mater. Nov. Tekh. Dokl. Nauchno-Tekh. Konf., 1969, pp 113-118 (1971).

The diffusion of gold in solid solutions of germanium with Si contents ranging from 0 to 4.5 at. % was determined. The pn junction method was used. (ERA citation 05:012190)

20M. Thermodynamics

AD-A082 858/2 PC **A03**/MF **A01**
Clemson Univ SC Dept of Mechanical Engineering
Three-Dimensional Transient Natural Convection in a Horizontal Cylinder: A Numerical Analysis.
Final rept. 16 May-31 Dec 79,
James A. Liburdy. Feb 80, 39p AFOSR-TR-80-0262
Contract F49620-79-C-0168

A mathematical formulation of the governing equations for transient natural convection in a finite length horizontal cylinder is developed and constructed in finite difference form. The boundary conditions consist of radial heat flux for a specified thermal resistance, axial heat flux from one closed end and three different conditions at the other end to represent exposure to a hot convecting gas environment. The formulation is expressed in terms of the vorticity equations, energy equation and a set of vector potential equations. Solution is by the alternating direction implicit method for the vorticity and energy equations and the successive over relaxation method for the vector potential equations. Numerical experiments were run using the model to determine the local wall heat flux and the local wall temperatures. A heat transfer correlation is presented in terms of the Nusselt and Rayleigh numbers. Steady state conditions are obtained for the nondimensional time approximately equal to .005. Circumferential heat transfer coefficient variations are shown with larger values occurring near the top of the cylinder. Axial coefficients vary within approximately 10 percent with the largest values occurring near the center of the cylinder. With respect to test conditions at the AEDC facility, the convective components appear to be less than 10 percent of the radiative heat flux to the cylinder walls when a high temperature gas (air) is enclosed in the cylinder.

DOE/TIC-11058 PC **A03**/MF **A01**
Argonne National Lab., IL.
Elementary Excitations in Liquid exp 3 He.
K. Skoeld, and C. A. Pelizzari. 1979, 34p
Contract W-31-109-ENG-38

The two isotopes of helium offer unique opportunities to test fundamental theories of quantum fluids. In the case of liquid exp 4 He, a Bose liquid, the elementary excitations have been studied extensively over the last two decades by neutron inelastic scattering. Similar studies of liquid exp 3 He, the Fermi liquid counterpart of liquid exp 4 He, have become possible only recently. From the results obtained so far for normal liquid exp 3 He the existence of zero sound as a well defined density excitation at finite wave-vectors (q approx. = q/sub F/) and finite temperatures (T approx. = T/sub F/) has been verified and the spin fluctuation spectrum has been measured. By comparing the neutron scattering results for the density fluctuation spectrum to RPA calculations with generalized polarization potentials important information has been obtained about the effective spin-symmetric interaction between exp 3 He atoms. The spin fluctuation spectrum is in agreement with the paramagnon model if a value close to unity is assumed for the contact dimensionless paramagnon parameter anti l. This implies that the nuclear spin system in normal liquid exp 3 He is close to ferromagnetic. (ERA citation 05:010753)

IC-77-137 PC **A02**/MF **A01**
International Centre for Theoretical Physics, Trieste (Italy).
Sign of d exp 2 H/dT exp 2.
R. Dipankar. Nov 77, 8p
U.S. Sales Only.

For a system with a given energy that has N different possible states, the H function (of thermodynamics) satisfies d exp 2 H/dt exp 2 >0 if N(<=)3, but d exp 2 H/dt exp 2 may be both positive and negative if N(>=)5. The case of N=4 remains undetermined. (Atomindex citation 09:415156)

INIS-mf-4343 PC **A05**/MF **A01**
Technische Univ. Hannover (Germany, F.R.). Fakultaet fuer Maschinenwesen.
Calculating the Temperature Transfer Function in Narrow Heated Channel Flows.
K. H. Raes. 17 Dec 76, 93p
In German.Diss. (D.Eng.).
U.S. Sales Only.

In heated flowing fluids, characteristic flow parameters can be determined on the basis of a harmonic analysis of the fluctuating component of thermoelement signals. The temperature fluctuations are influenced by fluidic and thermodynamic processes in their frequency-dependent characteristics, i.e. spectral power density, axial and radial transfer function, etc. Models of different degrees of sophistication may be used for the physical and mathematical description of these processes: 2-point-model; Slug model for plate, cylinder, and sphere; Multilayer model for the wall; Multilayer model for the fluid. In the framework of the preconditions of the models with regard to the type of flow, thermal conductivity of the fluid and the solid internals, and analyzed signal frequency, differential equations can be set up whose solutions can be given by analytic formulae or, in the most difficult case, in the matrix representation. (Atomindex citation 09:395520)

ORNL/CSD-51 PC **A12**/MF **A01**
Oak Ridge National Lab., TN.
TES: A Program for Simulating Phase Change Processes.
A. D. Solomon, and C. A. Serbin. Jan 80, 253p
Contract W-7405-ENG-26

The purpose and use of the computer program TES is for the simulation of a phase change process in a material due to heat input or extraction at its surface. The program arose from the need for a simulation tool in latent heat thermal energy storage modeling, and owes much to the questions stimulated by this important field. (ERA citation 05:014602)

UCID-17275 PC **A05**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
User's Manual for CNVUFAC, the General Dynamics Heat-Transfer Radiation View Factor Program.
R. L. Wong. 25 Jun 76, 77p
Contract W-7405-ENG-48

CNVUFAC, the General Dynamics heat-transfer radiation veiw factor program, has been adapted for use on the LLL CDC 7600 computer system. The input and output have been modified, and a node incrementing logic was included to make the code compatible with the TRUMP thermal analyzer and related codes. The program performs the multiple integration necessary to evaluate the geometric black-body radiaton node to node view factors. Card image output that contains node number and view factor information is generated for input into the related program GRAY. Program GRAY is then used to include the effects of gray-body emissivities and multiple reflections, generating the effective gray-body view factors usable in TRUMP. CNVUFAC uses an elemental area summation scheme to evaluate the multiple integrals. The program permits shadowing and self-shadowing. The basic configuration shapes that can be considered are cylinders, cones, spheres, ellipsoids, flat plates, disks, toroids, and polynomials of revolution. Portions of these shapes can also be considered. (ERA citation 05:012311)

UCID-17277 PC **A03**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
GRAY: A Program to Calculate Gray-Body Radiation Heat-Transfer View Factors from Black-Body View Factors.
R. L. Wong. 14 Jun 76, 30p
Contract W-7405-ENG-48

Program GRAY is written to perform the matrix manipulations necessary to convert black-body radiation heat-transfer view factors to gray-body view factors as required by thermal analyzer codes. The black-body view factors contain only geometric relationships. Program GRAY allows the effects of multiple gray-body reflections to be included. The resulting effective gray-body factors can then be used with the corresponding fourth-power temperature differences to obtain the net radiative heat flux. The program is written to accept a matrix input or the card image output generated by the black-body view factor program CNVUFAC. The resulting card image output generated by GRAY is in a form usable by the TRUMP thermal analyzer. (ERA citation 05:012887)

UCID-18305 PC **A02**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Power-Law Thermal Model for Blackbody Sources.
N. K. Del Grande. 30 Oct 79, 11p
Contract W-7405-ENG-48

The spectral radiant emittance W/sub E/ from a blackbody at a temperature kT for photons at energies E above the spectral peak (2.82144 kT) varies as (kT)/sup E/kT/. This power-law temperature dependence, an approximation of Planck's radiation law, may have applications for measuring the emissivity of sources emitting in the soft x-ray region. (ERA citation 05:010949)

UCID-18492 PC **A02**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Treatise on Planckian Spectra Showing Sensitivity of Measured Blackbody Temperatures to Background Radiation.
N. K. Del Grande. 10 Dec 79, 15p
Contract W-7405-ENG-48

This study approximates the Planckian integral. It applies the power-law thermal model to analyze the behavior of blackbody sources. The spectral intensity, at energy E, varies as the temperature kT raised to the power n = E/kT. A hypothetical background is introduced at E = 12 kT which doubles the blackbody signal recorded at this energy. This causes the inferred temperature and source intensity to be respectively 6% and 26% too high. This occurs since typical measurement methods assume a Planckian spectral shape. (ERA citation 05:012799)

20N. Wave Propagation

AD-A082 577/8 Not available NTIS
California Univ Irvine Dept of Physics
Microsecond Microwave Radiation Bursts from a Relativistic Electron Beam Rotating in a Plasma.
D. Tzach, C. W. Robertson, G. Benford, and N. Rostoker. 30 Jan 79, 5p UCI-TR-78-42, ARO-15118.3-P
Grant DAAG29-78-G-0020
Availability: Pub. in IEEE Transactions on Plasma Science, vPS-7 n2 p81-83 Jun 79 (No copies furnished by DTIC).

No abstract available.

AD-A082 578/6 Not available NTIS
California Univ Irvine Dept of Physics
Coherent Curvature Radiation from an Electron Beam Rotating in a Plasma.
D. Tzach, Gregory Benford, C. W. Roberson, and N. Rostoker. 25 Sep 78, 7p UCI-TR-79-8, ARO-15118.4-P

Grant DAAG29-78-G-0020
Availability: Pub. in Jnl. of Applied Physics, v50 n10 p6241-6246 Oct 79 (No copies furnished by DTIC).

No abstract available.

AD-A082 695/8 PC **A09**/MF **A01**
Naval Ocean Systems Center San Diego CA
'Simplified' VLF/LF Mode Conversion Computer Programs: GRNDMC and ARBNMC.
Interim rept. 1 Jan-31 Dec 79,
D. G. Morfitt. Jan 80, 181p Rept no. NOSC/TR-514
Contract MIPR-80-563

The computer programs GRNDMC and ARBNMC numerically determine vlf/lf mode conversion coefficients and mode sums for an earth-ionosphere waveguide which is inhomogeneous along the direction of propagation. GRNDMC generates values of the vertical electric field, Ez, at the ground as produced by a ground based vertical dipole source, ARBNMC calculates at an arbitrary height within the guide, all three electric field components (Ez, Ex and Ey) generated by an electric dipole of arbitrary orientation and height within the guide. The ARBNMC program treats air-to-air, ground-to-air or air-to-ground vlf/lf problems. It will also handle ground-to-ground propagation but is much less economical to run than GRNDMC. (Autor)

AD-A082 757/6 PC **A03**/MF **A01**
Mississippi State Univ Mississippi State
On the Singularity Expansion Method Applied to Aperture Penetration. Part I. Theory.
Interaction notes,
C. D. Taylor, T. T. Crow, and K. T. Chen. May 73, 27p Rept no. NOTE-134

A formulation for determining the electromagnetic field penetration through a circular aperture is developed using Babinet's principle and the singularity expansion method. Computational procedures for determining the penetration field of the aperture are discussed and a low frequency check of the procedures is proffered. (Author)

AD-A082 763/4 PC **A02**/MF **A01**
Sandia Labs Albuquerque NM
Missile Circumferential Current Density for Plane Wave Electromagnetic Field Illumination,
Charles W. Harrison, Jr. 30 Jul 70, 19p Rept no. SC-R-70-4324

The study of shadowing of plane wave electromagnetic fields by missiles is of importance because RF leakage into a missile through holes and slots in the wall and the RF pickup of cables furrowed into the skin leading to interior circuitry depends on the amplitude and the variation of current density along the circumference of the scattering obstacle. Clearly the azimuthal orientation of the missile with respect to the incident field has a bearing on the RF receiving characteristics of the slots and cables, if indeed electromagnetic field shadowing is significant. One topic discussed briefly in this memoradum is a theory for shadowing by tubular cylinders of arbitrary dimensions developed by Kao. As a practical matter, the coupled integral equations derived by him cannot readily be solved for very long cylinders because of the limited number of storage locations in a computer. To circumvent this, the author presents a theory for shadowing by a cylinder of infinite length. In the entire discussion of both finite and infinite tubes, it is assumed that the electric field is polarized parallel to the axis of the cylinder. This is the case of dominate interest in the field of RF hazards to ordnance. But this specific polarization is an unnecessary restriction. The angle the incident field makes with the axis of the cylinder may be arbitrary. In particular, the magnetic field may be polarized parallel to the conductor. (Author)

N80-21224/4 PC **A06**/MF **A01**
National Aeronautics and Space Administration, Washington, DC.
Image Properties of an X-Ray Telescope of the Wolter-1 Type with Emphasis on Contrast Reduction by Diffuse Reflection.
Ph.D. Thesis.
R. Lenzen. Jan 80, 105p NASA-TM-75805
Contract NASW-3198

Transl. Into English of "Abbildungseigenschaften Eines Roentgenteleskops Vom Type Wolter-1 Unter Besonderer Berueecksichtigung der Kontrastverminderung durch Diffuse Reflexion", (Germany, F.R.), 1978 p 1-123. Original Language Document Announced as A79-41829. Transl. By Scientific Translation Service, Santa Barbara, Calif.

Theoretical and experimental results are presented on the geometrical-optic imaging properties of a Wolter-1 type paraboloid-hyperboloid X-ray telescope. Particular consideration is given to the effect of microroughness of the mirror on the imaging properties. Experiments were conducted in which scattering properties were determined as a function of wavelength, incidence angle, and roughness of the plane mirrors. Results indicate the need for optimization of mirror material and polishing technology as well as the development of improved mirror manufacturing techniques. The use of transmission gratings along with the Wolter-1 type telescope in spectroscopy applications is discussed.

21. PROPULSION AND FUELS

21B. Combustion and Ignition

ANL/EES-TM-69 PC **A02**/MF **A01**
Argonne National Lab., IL.
Pulse Combustion Technology for Heating Applications. Quarterly Progress Report, July 1-September 30, 1979.
F. W. Ahrens, and J. M. Clinch. Dec 79, 14p
Contract W-31-109-ENG-38

The primary purpose of this program is to develop design data and procedures for pulse combustion burners. The program will thus contribute to the accelerated industrial development of cost-effective, high-efficiency systems for a variety of heating applications. The major program tasks are designated as: Burner Performance Studies, Burner Noise Studies, and Evaluation and Application. Analytical and experimental data for the period July 1, 1979, through September 30, 1979 for natural gas-fired pulse combustion burners are reported. (ERA citation 05:014042)

BNL-51088 PC **A04**/MF **A01**
Brookhaven National Lab., Upton, NY.
Report on the Combustion Research Contractors' Meeting.
R. B. Klemm, and J. T. Muckerman. Oct 79, 67p
Contract EY-76-C-02-0016

A total of 46 short papers or abstracts are included, arranged into sessions dealing with general and NSLS status, theory of reactivity and chemical dynamics in combustion, kinetics of combustion reactions, (two sessions), and laser diagnostics for high temperature and combustion systems. (ERA citation 05:014003)

COO-4740-8 PC **A02**/MF **A01**
Management and Technical Services Co., Clairton, PA.
Operation, Modification, and Maintenance of DOE/PETC 700 H.P. Combustion Test Facility. Quarterly Activity Report, October 1, 1979-December 30, 1979.
8p
Contract EW-78-C-02-4740

Four No. 6 and a 40% coal oil mixture test were run to provide check tests for the parametric test program in the 700 H.P. Combustion Test Facility, which officially completed this test series. The 500 hour endurance test was run without any unscheduled shut downs except to remove an excessive amount of ash which restricted heated gases from entering the convection section of the boiler after 370 hours of operations. During these tests, measurements were made inside the 700 H.P. boiler and at the stack to assess the performance of the combustor. The boiler was instrumented to permit detailed heat balances, emission measurements and flame characterizations. The particulate level in the stack was monitored using isokinetic stack samples and was compared to opacity data obtained from the transmissometer. The size distribution of the particulate matter in the stack was monitored by a cascade impactor. The average emissivity of the flame was determined using various targets and optical pyrometers. The boiler operated almost flawlessly during the 500 hours endurance test. It was necessary to change the burner nozzle every 8 hours to prevent nozzle plugging effecting combustion. Nozzle wear was evident throughout the test until TUNGSTEN CARBIDE inserts were tried during the last 40 hours of testing. (ERA citation 05:013044)

FE-1207-T15 PC **A09**/MF **A01**
Bituminous Coal Research, Inc., Monroeville, PA.
Gasifier Burner Ignition System.
Oct 79, 193p
Contract EF-77-C-01-1207

The BI-GAS pilot plant is designed such that its lower region (Stage I) is the combustion zone where oxygen and steam contact and react with recycled char. As with other combustion systems, provisions must be made to initiate combustion at start-up, to reinitiate combustion in case of a process upset where combustion is lost, and to continuously monitor the presence of combustion. An ignition system had to be developed, capable of reliable and repeated operation at pressures up to 1500 psi in a methane-rich or otherwise reducing atmosphere. The initial development work was done by Babcock and Wilcox and included development of both the ignitor system and the flame confirmation system. B and W's initial proposal specifically dealt with investigating a hypergolic (chemical auto-combustion) igniter. Hypergolic ignition is the spontaneous combustion of a compound upon contact with an oxygen containing media. This oxygen source includes air, oxygen, carbon dioxide, and water. The liquid compound studied was triethylaluminum (Al(C sub 2 H sub 5) sub 3) otherwise identified as TEA and supplied by Ethyl Corporation, Baton Rouge, Louisiana. The hypergolic ignition system has been operated successfully and proved reliable at high pressure (750 psig) through repeated testing over a three-year period. The system designed by Stearns-Roger based on the study by Babcock and Wilcox was basically correct. Two relatively minor design defects and operational revisions to improve performance were accomplished by on-site personnel with little expenditure of time or money. The remaining problems currently experienced with the TEA ignition system are considered minor. Further work should continue to determine the lowest possible TEA concentration that can be used and still provide consistent ignition, and the system should be tested soon at the full design operating pressure of 1500 psig. (ERA citation 05:011058)

FE-1207-T16 PC **A02**/MF **A01**
Bituminous Coal Research, Inc., Monroeville, PA.
Gas Generator Research and Development, BI-GAS Process. A Study of Flame Detection Devices in a High Pressure Gasifier.
Oct 79, 21p
Contract EF-77-C-01-1207

A principal feature of the BI-GAS Pilot Plant is the 2-stage, entrained-bed, high pressure (1500 psig max), oxygen blown, and ash slagging gasifier unit constructed by the Babcock and Wilcox Company. The gasifier is designed such that its lower region (Stage I) is the combustion zone where oxygen and steam contact and react with recycled char. As with other combustion systems, provisions must be made to initiate combustion at start-up, to reinitiate combustion in case of a process upset where combustion is lost, and to continuously monitor the presence of combustion. An ignition system had to be developed, capable of reliable and repeated operation at pressures up to 1500 psi in a methane-rich or otherwise reducing atmosphere. The initial development work was done by Babcock and Wilcox and included development of both the ignitor system and the flame confirmation system. One of the problems encountered in operating the BI-GAS Pilot Plant has been unreliable flame detection of the pilot burners in the high pressure gasifier. Since the operation of the slag tap burner (STB) and the slag heating burner (SHB) are prerequisites for the gasifier start-up as well as prolonged operation, verification of a flame is important to the pilot plant operation. The original Bailey Meter Company's Flamon ultraviolet detector had not provided that reliability as evidenced by numerous shutdowns of the gasifier.This report presents the findings of a study

aimed at evaluating several alternate commercially available flame detection devices with hopes of finding one capable of doing the job. An infrared Fireye flame detector made by Electronics Corporation of America showed very encouraging results. As a result, the Fireye was recommended and installed as the flame detection device on both pilot burners has proven superior to any of the ultraviolet detectors. (ERA citation 05:011059)

N80-20339/1 PC **A02**/MF **A01**
Polytechnic Inst. of New York. Aerodynamics Lab.
Application of Raman Diagnostics to Combustion.
Final Report.
S. Lederman, C. Posillico, and A. Celentano. Apr 80, 22p NASA-CR-162901, POLY-M/AE-80-8
Grant NSG-3108

The use of laser Raman diagnostic techniques to measure the specie concentrations and their temperatures in combustion flow fields is discussed. The system designed to measure the specie concentrations, which included a ruby laser and a photodiode to trip the laser at the maximum light and heat output of the combustion process, is described and problems encountered in developing the system are reported. Photographs of the combustion process are presented and analyzed detailing the evolution of the combustion in terms of the photodiode and the lack of a noticeable Raman-Stokes signal. The absence of the Raman-Stokes signal is discussed.

ORNL/TM-7141 PC **A04**/MF **A01**
Oak Ridge National Lab., TN.
One-Dimensional Model of Fluidized-Bed Combustor Dynamics.
R. B. Perez. Jan 80, 51p
Contract W-7405-ENG-26

Starting from Soo's basic multiphase equations, a set of one-dimensional time-dependent hydrodynamic and enthalpy equations was developed for a fluidized bed reactor by averaging over its cross sectional area. The following effects were not considered in the derivation of the FBC equations: forces to accelerate the apparent mass of the solid particle, basset force, heat exchange by radiation between solids and fluid or within each phase, and electrodynamic effects. Within these restrictions, the material developed here forms the basis for a sequel to this report devoted to the development of stability studies and to the application of stochastic methods for FBC surveillance. (ERA citation 05:011191)

PB80-166085 PC **A03**/MF **A01**
Massachusetts Inst. of Tech., Cambridge. Energy Lab.
Hydrocarbon Formation and Oxidation in Spark-Ignition Engines. Volume I. Summary.
Final rept. Sep 76-Aug 79,
John B. Heywood, James C. Keck, and Joe M. Rife. Jan 80, 44p MIT-EL-80-003
Sponsored in part by General Motors Research Labs., Warren, MI.

This report summarizes the key results and conceptual findings from a three-year research program on hydrocarbon formation and oxidation mechanisms in spark-ignition engines. Research was carried out in four areas: laminar flame quenching experimental and analytical studies; quench layer studies in a spark-ignition engine using a rapid acting gas sampling valve; flow visualization studies in a transparent engine to determine quench layer and quench crevice gas motion; studies of heat transfer, mixing and HC oxidation in the exhaust port. More detailed descriptions of the individual research activities in these areas can be found in the theses and publications completed to date which form Volumes II to XI of the final report of this program.

SAND-79-8285 PC **A03**/MF **A01**
Sandia Labs., Livermore, CA.
Fundamental Combustion and Diagnostics Research at Sandia. Progress Report, July-September 1979.
D. L. Hartley. Dec 79, 39p
Contract EY-76-C-04-0789

The combustion research at Sandia Laboratories sponsored by the Division of Basic Energy Sciences emphasizes basic research into fundamental problems associated with combustion. Special emphasis is placed on the development and application of advanced research methods. The overall program addresses: (1) detailed chemistry of combustion, (2) fundamental processes associated in laminar and turbulent flames, (3) development of research techniques specifically applicable to combustion environments, and (4) operation of the user-oriented Combustion Research Facility. (ERA citation 05:014004)

SAND-79-8717 PC **A05**/MF **A01**
Sandia Labs., Livermore, CA.
Laser Absorption Measurements of OH in a Methane-Air Flat Flame.
R. J. Cattolica. Dec 79, 79p CONF-791048-5
Contract EY-76-C-04-0789
The Combustion Institute Western States Section meeting, Berkeley, CA, USA, 15 Oct 1979.

The OH radical concentration and rotational temperature were measured in atmospheric pressure methane-air flat flames using absorption spectra obtained with a tunable dye laser. The OH radical nonequilibrium and the associated recombination in the post flame gases were observed for fuel-air equivalence ratios of .8, .9, 1.0, 1.1, 1.2. The predicted peak OH concentrations from one-dimensional laminar flame models were found to be in good agreement with the measured values. The OH decay profiles were consistent with a second-order dependence of the decay on the OH concentration. Although this dependence is associated with the recombination chemistry for the fuel-rich flames, it appears that for the lean flames diffusional transport is responsible. The OH decay rate constant was nearly the same for the stoichiometric and lean conditions, but was found to increase substantially for the fuel-rich conditions. 25 figures, 5 tables. (ERA citation 05:011410)

SAND-79-8807 PC **A02**/MF **A01**
Sandia Labs., Livermore, CA.
Coherent Raman Combustion Diagnostics.
P. L. Mattern, and L. A. Rahn. 1980, 19p CONF-800303-2
Contract EY-76-C-04-0789
179. national meeting of the American Chemical Society, Houston, TX, USA, 23 Mar 1980.

Recently, background-free coherent anti-Stokes Raman scattering and inverse Raman scattering have been used to detect small (few percent) concentrations of CO in a methane-air flame. This paper reports calculated detectivities for these techniques, as compared with spontaneous Raman scattering, for a broad range of temperature, pressure, and background luminosities. (ERA citation 05:012270)

21D. Fuels

AD-A082 610/7 PC **A03**/MF **A01**
Atlantic Research Corp Alexandria VA Combustion and Physical Science Dept
Chemical Initiation of FAE Clouds.
Annual interim rept. Sep 78-Sep 79,
G. von Elbe, and E. T. McHale. Nov 79, 37p
AFOSR-TR-80-0113
Contract F49620-77-C-0097

Laboratory experiments with liquid fuel and ClF3 (CTF) or BrF3 (BTF) have suggested that an effective FAE blast may be obtained by very rapid fuel/agent dispersion and agent-induced combustion. In the current work, initial small-scale field tests using small pellets of high-explosive for fuel and agent dispersion have yielded significant FAE blasts when performed in open air, no blast when performed in an atmosphere of nitrogen, and a very strong blast when performed in an atmosphere of oxygen. The results show that an agent such as CTF meets the requirements of inducing very rapid combustion, and that the strength of the FAE blast is thus principally governed by the size and configuration of the central dispersing charge. Further small-scale tests are scheduled in which the central charge is substantially enlarged and shaped for injecting high velocity jets of fuel/agent dispersion into the surrounding atmosphere. (Author)

AD-A082 716/2 PC **A07**/MF **A01**
Ultrasystems Inc Irvine CA
Potential Sites for Joint Venture Biomass Fueled Power Plants.
Final rept.
2 Jan 80, 150p USAFESA-TS-2078
Contract DAAK70-79-M-4882

The US Army is investigating wood-fired boilers. One application is for wood fuels to fire fixed power plant installations where the technology is well proven. Approximately 170 Army bases were evaluated for their heating and electrical needs versus fuel availability from on-base forests. Approximately 20 bases met the minimum demand and resource criteria. Potential joint venture partner classes were identified as new Contractor Owner/Contractor Operated (COCO) entrepreneurs; existing utilities and industries in the vicinity of the bases; and existing Government Owned/Contractor Operated (GOCO) entrepreneurs. (Author)

AD-A082 756/8 PC **A10**/MF **A01**
TRW Defense and Space Systems Group Redondo Beach CA Applied Technology Div
Potential Application of BIOMASS Technology at National Space Technology Laboratories and Mississippi Army Ammunition Plant.
Final rept. 30 Jun 78-29 Feb 80,
E. P. Motley, B. G. Cruz, L. McClanathan, and J. A. Anastasi. Feb 80, 211p Rept no. TRW-33682
Contract DAAK10-78-C-0268

This study was initiated to evaluate the feasibility of utilizing a common biomass (energy wood) system to produce energy for use at NASA's National Space Technology Laboratories (NSTL) and the proposed Mississippi Army Ammunition Plant (MSAAP) to be established at NSTL. The study investigated: the form and quantity of energy required at NSTL and MSAAP; the amount and characteristics of the available energy wood supply; the conversion technology; the legal and environmental issues associated with the operation of an energy wood plant; and the economics of an energy wood plant.

AD-A082 773/3 PC **A06**/MF **A01**
Construction Engineering Research Lab (Army) Champaign IL
Production and Use of Densified Refuse-Derived Fuel (DRDF) in Military Central Heating and Power Plants.
Final rept.,
S. A. Hathaway, J. S. Lin, D. L. Mahon, B. West, and R. Marsh. Mar 80, 104p Rept no. CERL-TR-E-159
Contract MIPR-FY8952-78-65012

This study appraises the state of the art of production and use of densified refuse-derived fuel (DRDF) in military-scale (25 to 200 MBtu per hour) central heating and power plants. It found that few performance and economic data exist for military-scale DRDF production unit operations. Although theoretical modeling of some operations (shredding, air classifying, pelleting) is generally well developed, field verification of the models is beleaguered by continued alterations of in-place equipment design to improve performance, lack of a uniform method to characterize refuse input to processes, and absence of an industry-wide commitment to monitor equipment performance. Although nearly two dozen DRDF tests have been conducted, they have been short-term experiments that have not followed the scientific method and have been inconclusive regarding long-term DRDF use in military heating and power plants. As a result, proper and realistic specification of DRDF for military procurement cannot be made. The study also found that lack of operating data, standard analytical procedures, and experience in military-scale DRDF systems engenders high risk in their implementation at present. The study found that proper management and disposal of byproducts and potential environmental pollutants from DRDF production and use can be achieved with available technology, but that the costs of control are significant.

BETC/PPS-79/5 PC **A03**/MF **A01**
Department of Energy, Bartlesville, OK. Bartlesville Energy Technology Center.
Diesel Fuel Oils, 1979.
E. M. Shelton. Dec 79, 38p

Properties of diesel fuels produced during 1979 were submitted for study and compilation under a

cooperative agreement between the Department of Energy (DOE), Bartlesville Energy Technology Center (BETC), Bartlesville, Oklahoma and the American Petroleum Institute (API). Tests of 200 samples of diesel fuel oils from 94 refineries throughout the country were made by 29 petroleum refining companies. The analyses of the fuels are listed in tables for four groups according to type of diesel fuel. Each group of analyses is subdivided into five tabulations according to five general regions of the country where the fuels are marketed. The regions, containing a total of 16 districts, are shown on a map in the report. Data from 13 laboratory tests on each individual diesel fuel sample are listed and arranged by geographic marketing districts in decreasing order of sales volumes. Charts are included showing trends of averages of certain properties for the four types of diesel fuels for the years 1960-1979. Summaries of the results of the 1979 survey, compared with similar data for 1978, are shown in tables 1 through 4 of the report. (ERA citation 05:011246)

BMI-2031(V.2) PC **A04**/MF **A01**
Battelle Columbus Labs., OH.
Carbohydrate Crops as a Renewable Resource for Fuels Production. Volume II. Identification of Key Policy Issues, Alternatives, and Implications Relating Energy from Biomass.
D. A. Scantland, T. A. McClure, and E. S. Lipinsky. 30 May 79, 75p
Contract W-7405-ENG-92

The objectives of this research program were threefold: Provide a brief summary assessment of current and developing technologies utilizing carbohydrate crops as potential energy resources; provide an economic analysis of current agricultural policies and their implications concerning the potential use of the carbohydrate crops as biomass energy sources; and identify and examine alternative policies for stimulating biomass production for fuel uses. The conclusions of this preliminary analysis of policy implications suggest the following: (1) Significant quantities of ethanol from carbohydrate crops could be produced from the equivalent number of dollars currently diverted and expected to be spent under the Food and Agriculture Act of 1977 (FAA-'77). (2) However, the production of ethanol from sugar crops or corn would mean that significant changes in the prices of agricultural products could be expected (all other things being equal). (3) In the initial development of ethanol fuels, ethanol from corn appears to be the least expensive as compared to sugarcane, sugar beets, and sweet sorghum. This is primarily because of high by-product credits. However, the crop with the greatest long-term potential is sweet sorghum. (4) Various policy incentive programs will continue to be directed towards stimulating biomass energy production. Several incentive systems already have been recommended in Congress and among the states. Key among these is the present waiver of the Federal Excise Tax through 1984 on gasohol. Battelle has cited a number of potential incentive programs. Each incentive will tend to stimulate different areas of biomass and fuels production. Also, the programs likely will have secondary impacts on other segments of the U.S. agricultural sector. Four policy incentive programs are described in detail. (ERA citation 05:011576)

BMI-2033(V.1) PC **A07**/MF **A01**
Battelle Columbus Labs., OH.
Systems Study of the Potential Integration of US Corn Production and Cattle Feeding with Manufacture of Fuels Via Fermentation.
E. S. Lipinsky, D. A. Scantland, and T. A. McClure. 4 Jun 79, 147p
Contract W-7405-ENG-92-077

The results of a study of the feasibility of making corn grain available for conversion into motor fuel ingredients without undue disruption of the price structure for beef and other meat products that are now dependent on inexpensive corn grain are presented. Corn grain for cattle feeding would be replaced by corn stover and supplemented with distillers dried grains and solubles (DDGS), a by-product of ethanol fermentation from corn grain. Thus, the unique capability of ruminant animals to use cellulose as the carbon source for meat production could be exploited, and as a result of ethanol fermentation, the protein contained in the corn grain and in the yeast could be used for livestock production. The nutritional value of corn stover in mixtures with DDGS probably would not satisfy the needs of feedlot operators. However, the high potential of the proposed system, and concern over the validity of existing corn stover nutritional data, strongly justifies cattle feeding trials. Upgrading of corn stover by the Iotech Process, Purdue Process, or alkali could increase the nutritional value but also would increase the cost of the cellulose material. The production of even one billion gallons of ethanol from corn grain in Midwestern states would lead to six times the present production of DDGS. This additional DDGS would compete with soybean meal, depressing prices for the soybean farmers.At the same time, the price of corn would be expected to rise, perhaps as high as $3 per bushel from a base of $2.27 per bushel. Because of these drastic anticipated changes in corn and soybean prices through implementation of this system, attractive beef prices may not result. Furthermore, the rise in corn grain prices and decline in DDGS prices are the opposite of what is needed for production of inexpensive ethanol from corn grain. These effects may not be observed in practice if land formerly devoted to soybean production could be utilized to grow additional corn. (ERA citation 05:012591)

BNL-26941 PC **A02**/MF **A01**
Brookhaven National Lab., Upton, NY.
Atomization of Coal Slurry Jets.
T. Butcher, A. Pucci, and C. R. Krishna. 1979, 13p CONF-791160-1
Contract EY-76-C-02-0016
International symposium on coal-oil mixture combustion, Danvers, MA, USA, 27 Nov 1979.

In the atomization of liquids the first step is the spreading of the liquid into thin sheets or columns either by fluid momentum or gas-fluid interaction. The thin sheets or columns will then breakup into droplets under the action of surface tension. The simplest case of this is the breakup of a liquid jet and as a step towards understanding the atomization of coal-oil mixtures this has been studied. The clasic work which has been done for liquid jets has been reviewed and repeated in part for coal-oil and coal-water mixtures. Jet length and drop size have been examined for water and No. 2 oil slurries up to 30% concentration. The relevance of this work for atomization is discussed and preliminary data from an air-atomized nozzle is presented for illustration. (ERA citation 05:011174)

CONF-791108-15 PC **A04**/MF **A01**
Kansas State Univ., Manhattan. Dept. of Chemical Engineering.
Thermodynamically-Oriented Analysis and Heuristic Synthesis of a Process System-Hygas Process.
L. T. Fan, J. H. Shieh, Y. Shimizu, and S. Y. Chiu. 29 May 79, 55p
Contract W-31-109-ENG-38
72. AICHE meeting, San Francisco, CA, USA, 25 Nov 1979.

The concept of thermodynamically-oriented analysis and heuristic synthesis have been applied to a commercial concept design of the HYGAS coal gasification process. The thermodynamic first and second-law efficiencies of the process have been determined to be 67.73% and 62.15%, respectively. It has been identified that the major thermodynamic inefficiencies of this process arise from the gas cleanup unit (unit 7400) and the ammonia unit (unit 5200). The first and second-law efficiencies of the gas cleanup unit are 6.37% and 15.64%, respectively, and those of the ammonia recovery unit are 34.4% and 59.3%, respectively. Three possible configurations of the HYGAS process are compared. (ERA citation 05:012908)

COO-2917-13 PC **A08**/MF **A01**
Illinois Univ. at Urbana-Champaign. Dept. of Civil Engineering.
Biological Conversion of Biomass to Methane Corn Stover Studies. Project Report, December 1, 1977-August 1, 1978.
J. T. Pfeffer, and G. E. Quindry. Jun 79, 171p
Contract EY-76-S-02-2917

A series of experiments was conducted to determine the performance characteristics of the methane fermentation process using corn stover obtained from the University of Illinois farms and processed through four parallel fermenters each having a capacity of 775 liters. A continuous feed system was employed to determine the conversion efficiency. The dewatering characteristics of the effluents and the quality of the liquid and solid residues were determined. The biodegradability of corn stover is low. Data obtained at a fermentation temperature of 59 +-1 exp 0 C show that only 36 percent of the volatile solids are biodegradable. The first order rate constant for this conversion was found to be 0.25 day exp -1 . Pretreatment with caustic (NaOH) concentration of 0.30 molar (5 g/100 g dry stover) and a temperature of 115 exp 0 C for one hour increased the biodegradable fraction to 71 percent of the volatile solids. The reactor slurries were easily dewatered by both vacuum filtration and centrifugation. Corn stover does not appear to be attractive economically at the present energy prices. At a chemical cost of $154/tonne ($140/ton), the NaOH pretreatment adds approximately $5.2/tonne to the cost of processing the stover. At a methane yield of 0.25 m exp 3 /kg of solids fed, this adds a total cost of $2/100 m exp 3 ($0.57/MCF) for this process alone. Addition of stover acquisition costs ($20/dry tonne of stover), total processing costs without gas cleanup ($21/tonne) and residue disposal ($3/tonne of wet cake), the cost of fuel gas would be in the neighborhood of $9.76/GJ ($10.30/10 exp 6 Btu).This cost excludes all profit, taxes, etc. associated with private financing. Depending upon financing methods, tax incentives, etc., it may be necessary to add up to an additional $2.00/GJ to the cost of this fuel gas. (ERA citation 05:011411)

COO-2981-11 PC **A03**/MF **A01**
New York State Coll. of Agriculture and Life Sciences, Ithaca. Dept. of Agricultural Engineering.
Anaerobic Fermentation of Agricultural Residues: Potential for Improvement and Implementation. Eleventh Quarter Progress Report, December 16, 1978-March 15, 1979.
W. J. Jewell. 1979, 33p
Contract EY-76-S-02-2981

The Cornell University project on production of methane from agricultural residues has as its main goal the development of a low-cost methane gas generation system for use on small agricultural operations. Five different types of anaerobic fermentor reactor designs are presently being operated, with the majority of effort focused on two full scale reactors (both about 35m exp 3) designed to process the residues produced by 65-cow dairies. Three pilot units (5m exp 3 volume) are being operated to determine the limits of operation variables -- temperature, labor inputs, mixing, and bedding composition. Variables being evaluated with the pilot reactors include: temperature of operation (25 exp 0 C and 35 exp 0 C), straw and sawdust bedding addition, intermittent feeding (once per day to once per week), mixing (none to once per 4 days), and moisture content (90 percent to 60 percent moisture). The low-cost full scale plug flow reactor has now been operated for nearly one year, including the winter with the lowest temperature (down to minus 25 exp 0 C) for the longest period recorded for the northern New York area. Preliminary analysis of the data indicates more efficient solids conversion with the plug flow design (41 percent TVS destruction efficiency) than with the completely mixed full scale system (31.7 percent TVS destruction efficiency) when operating at a 30-day hydraulic retention time at 35 exp 0 C. Although analysis of the thermal data is incomplete, comprehensive heat loss studies were conducted during the cold period.The efficiency of the boiler-hot water heating system varied bewteen 40 and 55 percent. The net energy production during the coldest conditions (worst case) was estimated to be 44 percent at a 15-day HRT at 35 exp 0 C with the low-cost plug flow system. Considerable operatonal problems with the full scale systems occurred during the coldest winter period; but these problems were not caused by the weather. (ERA citation 05:011412)

COO-2981-12 PC **A04**/MF **A01**
New York State Coll. of Agriculture and Life Sciences, Ithaca.

Anaerobic Fermentation of Agricultural Residues: Potential for Improvement and Implementation. Twelfth Quarter Progress Report, 16 March 1979-15 June 1979 and Addendum Describing Project Activities, 16 June 1979-15 October 1979.
W. J. Jewell. 1979, 53p
Contract EY-76-S-02-2981

Five different types of anaerobic fermentor reactor designs were operated, with the majority of effort focused on two full scale reactors (both about 35m exp 3), each designed to process the manure residues from up to 65 dairy cows. Three pilot units (5m exp 3 volume) are being operated to determine the limits of operation variables - temperature, labor inputs, mixing, and bedding composition. The low-cost full scale plug flow reactor has now been operated for more than one year, including the winter with the lowest temperature for the longest period recorded for the northern New York area. During the twelfth quarter the full scale plug flow and conventional control reactors were tested in parallel at new conditions of 15 days and 10 days HRT, 35 exp 0 C and 10 to 12% TS manure feed. Steady state results for the 15 day HRT condition once more indicated a more efficient solids conversion with the plug flow design (34.1% TVS destruction efficiency) than with the completely mixed full scale system (27.8% TVS destruction efficiency) when operated on dairy manure (13% TS) at 35 exp 0 C. No serious operational problems have been encountered with either full scale reactor during the twelfth quarter. Thermal data from the plug flow reactor has now been obtained for a full year cycle. The apparent overall efficiency of the boiler and reactor heating systems varied between 40 and 55%. In order to translate the temperature and operating data of the plug flow unit into a comprehensible energy balance, a computer model for the prediction of energy production and for the description of conducted heat losses and feed heating requirements was developed. Data analysis and the development of certain sections of the final report were given considerable attention throughout the twelfth quarter. The preparation of the farmer's feasibility manual was also initiated during this period. (ERA citation 05:011413)

COO-4388-7 PC **A05**/MF **A01**
Dynatech R/D Co., Cambridge, MA.
Liquid Fuels Production from Biomass. Progress Report No. 7, January 1-March 31, 1979.
J. E. Sanderson, D. V. Garcia-Martinez, G. S. George, J. J. Dillon, and D. L. Wise. 1979, 86p
Contract EG-77-C-02-4388

The current program to convert biomass into liquid hydrocarbon fuels is an extension of the previous program to ferment marine algae to acetic acid. In that study, it was found that marine algae could be converted to higher aliphatic organic acids and that these acids could be readily removed from the fermentation broth by membrane or liquid-liquid extraction. It was then proposed to convert these higher organic acids to aliphatic hydrocarbons via Kolbe Electrolysis, which may be used as a diesel fuel. The specific goals for the current program are: (1) establish conditions under which substrates other than marine algae may be converted in good yield to organic acids. The primary task in this regard is methane suppression; (2) modify the current 300 liter fixed packed bed batch fermenter to operate in a continuous mode; (3) change from membrane extraction of organic acids to liquid-liquid extraction; (4) optimize the energy balance of the electrolytic oxidation process. The primary task in this regard is to reduce the working potential required for the electrolysis while maintaining an adequate current density; (5) scale the entire process up to match the ouput of the 300 liter fermenter. The accomplishments in this program are on schedule. Experimental results have shown that the electrolysis of organic acids produced by fermentation to liquid hydrocarbon fuels is already operating with a favorable energy balance of 6/1 based on the applied potential and over 10/1 based on the working potential. 2-Bromoethanesulfonic acid, a coenzyme M analogue, has been shown to be an effective methane suppressor, and the program is being rapidly expanded to include biomass substrates other than marine algae. In addition, considerable effort has been directed toward refining the process design and economic analysis presented previously. (ERA citation 05:013208)

COO-4755-T1 PC **A02**/MF **A01**
Missouri Univ.-Rolla.
Economic and Kinetic Studies of the Production of Chemicals and Farm Energy by Fermentation of Biomass.
J. L. Gaddy. 1979, 8p
Contract EW-78-A-02-4755

The farm energy system has been constructed in Drury, Missouri. The purpose of this unit is to demonstrate the feasibility of producing energy for farms (heat and electricity) from methane produced by anaerobic digestion of crop residues and other crop materials. The acid hydrolysis pre-treatment of corn stover studies utilize a two stage sulfuric acid contact. In the first stage, dilute sulfuric acid is used to hydrolyze the pentosan fraction of ground biomass. The second stage uses concentrated sulfuric acid for hexosan hydrolysis. The use of the two steps give high yields, possible with concentrated acid, without the problems of pentose decomposition. (ERA citation 05:013209)

COO-5035-3 PC **A07**/MF **A01**
Little (Arthur D.), Inc., Cambridge, MA.
Herbaceous Species Screening Program. Phase I. Final Report.
K. A. Saterson, M. K. Luppold, K. M. Scow, and R. E. Lee. Jul 79, 140p
Contract ET-78-C-02-5035

This report summarizes the results of Phase I of the DOE Biomass Energy Systems Branch Herbaceous Species Screening Program. The overall objective of the program is to designate the herbaceous plant species that might be promising candidates for biomass production in different regions of the United States (Phase I) and to then conduct field screenings on those species in order to identify the most promising species for future research and development (Phase II). The United States was divided into ten regions, based on the SCS Land Resource Areas, and the six that appear to offer the most potential for commercial biomass production were identified. A literature review and field interviews generated a list of 280 promising species, on which botanical as well as supplemental economic screenings were conducted for nine of the ten regions. The result of the screening is a list, for each region, of up to 20 species that appear to have potential for high biomass productivity and should be considered for inclusion in Phase II field screening. A total of 70 different species were included in the nine regional lists. (ERA citation 05:013296)

DOE/ET/20638-T1 PC **A02**/MF **A01**
Science and Education Administration, Clay Center, NE. Meat Animal Research Center.
Anaerobic Fermentation of Livestock and Crop Residues. Quarterly Progress Report, July-September, 1979.
A. G. Hashimoto, and Y. R. Chen. 1979, 5p
Contract AI01-79ET20638

The overall objective of this project is to evaluate the technical and economic feasibility of the anaerobic fermentation process to recover methane and high protein biomass from beef cattle and crop residues. The specific objectives of interest to the Department of Energy are: (a) to develop design criteria for optimum production of methane from anaerobic digestion of beef cattle qnd crop residue; and (b) to determine the capital and operating costs, and energy, manpower and safety requirements for anaerobic fermentation systems associated with livestock operations. This report summarizes the operation of the pilot-scale fermentor during the reporting period. (ERA citation 05:013210)

DOE/RA/7151-1 PC **A09**/MF **A01**
Kavernen Bau- und Betriebs, G.m.b.H., Hanover (Germany, F.R.).
Evaluation of the Effects of Long-Term-Storage in Salt Caverns on the Physical and Chemical Properties of Certain Crude Oils and Distillate Fuel Oils. Final Report.
Jul 79, 194p
Contract EL-78-C-01-7151

The effects of long-term storage of crude oil and fuel oil in salt caverns were investigated. Fifty oil and brine samples from three caverns in West Germany were analyzed. Results show that: (a) mixing has taken place but variation in properties such as density and viscosity are negligible; (b) some primary theoretical layers are still recognizable, based on the concentration of sulfur, mercaptans, salt, as well as by neutralization number; and (c) mixing occurs more readily when a heavy crude oil is stored above a light crude. It is concluded that crude and fuel oil have not undergone any deleterious changes. (ERA citation 05:013071)

DOE/TID/0033-1 PC **A03**/MF **A01**
Oak Ridge Associated Universities, Inc., TN.
University Manpower in Fossil-Energy Research and Development: A Data-Collection-Feasibility Study.
M. G. Finn. Sep 79, 47p
Contract EY-76-C-05-0033

This report presents data on the manpower engaged in DOE-funded fossil energy research in universities. It identifies man-months of graduate student, faculty, and staff inputs to this research effort by discipline, and in most cases also by subdiscipline. The data presented come primarily from a review of research proposals and contracts in DOE files conducted during the summer of 1978. All of the projects examined were active during the 1977 and/or 1978 calendar years. While all the data come from this source, they were checked and classified by energy area using information from the Oak Ridge National Laboratory Energy Inventory, a compilation of energy research in progress. All data are presented in a form that permits their use in estimating the manpower implications of changes in DOE research budgets. The method used to collect the data is described, and a preliminary assessment of the feasibility of expanding the method to collect manpower data on all DOE-funded university research is made. (ERA citation 05:013695)

DOE-tr-201 PC **A03**/MF **A01**
Use of Nuclear Magnetic Resonance for Analyzing High-Molecular Fractions of Fuel Samples.
I. Lang, G. Sebor, M. Kosina, and M. Kustka. 1978, 30p
A , Sb. Pr. UVP , 35 P190-238 1978.

Methods used for calculating structural parameters of high-molecular portions of fuel samples based on the data of exp 1 H and exp 13 C NMR are summarized. A potential application of the above in our fuel analytical technique is discussed. (ERA citation 05:011119)

DSE-2404-T2 PC **A03**/MF **A01**
Tracey and Brunstrom Co., Seattle, WA.
Engineering Feasibility of Fuels from Biomass Utilizing Dairy Farm Residue.
R. T. Skrinde. 1 Jul 78, 37p
Contract EX-76-C-01-2404

The design and operation of a fermentation facility at the Monroe State Dairy Farm. Washington, which produces methane gas from cattle manure was described. The Monroe process was evaluated and the feasibility of adapting the process to energy production on US farms was discussed. Pipe sizes, types of pumps used, and other factors which bear on operation were evaluated and design changes were recommended. Equipment costs and long term operating costs were also evaluated. (ERA citation 05:011415)

DSE-3891-T2 PC **A02**/MF **A01**
Stanford Univ., CA. Dept. of Civil Engineering.
Heat Treatment of Organics for Increasing Anaerobic Biodegradability. Quarterly Progress Report, July 1, 1979-September 30, 1979.
D. Stuckey, P. J. Colberg, K. Baugh, L. Y. Young, and P. L. McCarty. 1979, 18p
Contract EG-77-X-01-3891

The objective of this study is to evaluate thermochemical pretreatment as a method for increasing the anaerobic biodegradability of organic materials so that they can be more completely fermented to methane gas, a potential source of fuel. The current study has four specific phases: (1) biological conversion of lignocellulose to methane, (2) biodegradation of lignin and lignin fractions, (3) pretreatment of nitrogenous organics for increasing biodegradability, (4) biodegradation of lignin aromatic compounds, and (5) biochemical methane poten-

tial and toxicity testing. Results are reported for phases one, two, and three. No new information is available for phases four and five at this time. (ERA citation 05:013211)

EPRI-FP-1228 PC **A04**/MF **A01**
General Electric Corporate Research and Development, Schenectady, NY.
Moessbauer Effect Spectroscopic Study of Pyritic Sulfur in Coal. Final Report.
L. M. Levinson. Oct 79, 66p

The Moessbauer spectroscopic technique has been adapted to provide a reliable measurement of pyritic sulfur in coal. The Moessbauer method is quick, nondestructive, and adaptable to automation. It can be applied to processed as well as raw coals. Several difficulties hindering the use of Moessbauer spectroscopy for pyritic measurements have been resolved. Sample homogenization techniques consistent with the spectroscopic requirements were developed. A special sample holder compatible with a 5 to 10 g coal sample was designed. Two calibration curves were evaluated: one based on a mixture of pyrite and graphite, the other on HCl-leached coal. A simple correction method for the effects of ash absorption was demonstrated. Nine coals from different seams were evaluated; two of these coals had been cleaned by advanced coal cleaning methods. Differences between the Moessbauer and ASTM wet chemical methods for analyzing pyritic sulfur in coal were evaluated. Good agreement was shown, provided residual undissolved pyrite in the ASTM method is taken into account. Analysis of spectrometer capability indicates a routine sample could be analyzed in about 10 minutes. Spectrometer cost is estimated at $15,000. (ERA citation 05:011117)

FE-0497-T9 PC **A06**/MF **A01**
West Virginia Univ., Morgantown. Coll. of Engineering.
Role of the Char-CO sub 2 Reaction in Coal Gasification. Final Report.
C. Y. Wen, A. F. Galli, and J. T. Sears. 1980, 110p
Contract EX-76-C-01-0497

The Char-CO sub 2 -CO reaction has been examined on a fundamental basis. Data have been taken in a kinetic regime which are free of interfering effects such as bed effects and particle diffusional effects. Carbon monoxide inhibition was greater at relatively lower temperatures for the char system. An increase in the char reactivity based on remaining char was found during the course of reaction for bituminous, lignite, and subbituminous chars. The effect of particle size on the Char-CO sub 2 -CO reaction was examined. Carbon monoxide inhibition was found to be the same regardless of the particle size. Different pyrolysis techniques were found to lead to different oxygen content and surface area of the chars. Differences in char reactivity due to the char preparation method have been found, and can be explained on the basis of char oxygen content and surface area. Enhanced reactivity from calcium catalytic effects were found to be more pronounced in CO sub 2 -CO gas mixture as compared to effects with pure CO sub 2 . Presence of the calcium decreases the inhibiting effects of CO by affecting the reaction mechanism. Catalysis by CaO is explained by an electron transfer/atomic transfer mechanism which is consistent with the experimental data. In lignite char the Char-CO sub 2 reaction cannot be approximated as a first order reaction for coals due to catalysis. In fact, it is more likely to be between zero and first order. (ERA citation 05:012913)

FE-1207-T12 PC **A02**/MF **A01**
Bituminous Coal Research, Inc., Monroeville, PA.
Gas Generator Research and Development, BI-GAS Process. On-Stream Gas Analysis.
Oct 79, 25p
Contract EF-77-C-01-1207

The BI-GAS Pilot Plant, located in Homer City, Pennsylvania, is designed to study a new process for the conversion of coal into pipeline quality gas. The most tangible result and the most important objective of the BI-GAS Pilot Plant has been to build a data base from which economic, process and environmental evaluations can be made. Commercialization is based on those evaluations. It is therefore, necessary to attain a reliable and accurate on-stream gas analysis because it plays a big part in building that data base. Efforts to do that required solving several problems in sampling techniques and analyzing procedures. Five major problems surfaced as a result of the development work in on-stream gas analysis. Three that were solved successfully were accurate and reliable hydrogen and water concentration determinations, and high pressure and temperature sampling of a dirty gas. One of the problems that still needs work is in the area of chromatographic analysis of ammonia and hydrogen sulfide. Separation of the gasification products is not yet clean and therefore an accurate concentration determination not yet possible. The other problem still unresolved is in the sampling of the gas washer overhead line. Except for analyzing for ammonia in the presence of hydrogen sulfide, the analysis of all streams are accurate enough for use in material and energy balances and for control of plant operation. (ERA citation 05:011056)

FE-1207-65(V.1) PC **A17**/MF **A01**
Bituminous Coal Research, Inc., Monroeville, PA.
Gas Generator Research and Development BI-Gas Process. Interim Report, July 1978-June 30, 1979.
Aug 79, 388p BCR-L-1002(V.1)
Contract EF-77-C-01-1207

Life tests of catalysts identified by number are reported. The data from PEDU Test No. 30 confirmed that it is possible to operate under conditions of combined shift and methanation for extended periods of time without experiencing catalyst deactivation through carbon formation. The data from PEDU Test No. 31, using the same catalyst charge as used in Test No. 30, were evaluated and again confirmed the feasibility of operating the fluidized-bed methanator at low feed hydrogen-to-carbon monoxide ratios for extended periods of time. In PEDU Test No. 32 the catalyst, a noble metal-promoted nickel catalyst, was the most active of any tested to date. It also showed greater methanation selectivity than the BI-GAS pilot plant methanation catalyst. The data show that with this catalyst it was possible to obtain a product gas meeting pipeline quality specifications in a single pass through the fluidized bed methanator, without the need for polishing methanation (and without the need for secondary carbon dioxide removal). PEDU Test No. 33 reinforced the conclusions from Test No. 32 that the excellent activity and thermal stability of the catalyst are offset by its rather poor mechanical stability. In PEDU Test. No. 34 the carbon content of the catalyst increased from an initial level of 2.6 to a final level of 4.0 percent, and the data from this and previous PEDU tests with this catalyst suggest that significant catalyst deactivation will occur when the carbon content exceeds 3 percent. In PEDU Test No. 35 useful conversions of 98 percent were obtained under these conditions, and, although the final carbon content of the catalyst was 1.4 percent, the catalyst showed no tendency toward deactivation. In PEDU Test No. 36 the thermal stability and attrition resistance of the catalyst were also satisfactory. The catalyst appeared to have potential for use in a combined shift and methanation application, and this will be investigated further. (ERA citation 05:012914)

FE-2029-9 PC **A10**/MF **A01**
Purdue Univ., Lafayette, IN. Combustion Lab. .
Gasification in Pulverized Coal Flames. Final Report (Part I). Pulverized Coal Combustion and Gasification in a Cyclone Reactor: Experiment and Model.
J. S. Barnhart, and N. M. Laurendeau. May 79, 203p
Contract EX-76-C-01-2029

A unified experimental and analytical study of pulverized coal combustion and low-BTU gasification in an atmospheric cyclone reactor was performed. Experimental results include several series of coal combustion tests and a coal gasification test carried out via fuel-rich combustion without steam addition. Reactor stability was excellent over a range of equivalence ratios from .67 to 2.4 and air flowrates from 60 to 220 lb/hr. Typical carbon efficiencies were 95% for air-rich and stoichiometric tests and 80% for gasification tests. The best gasification results were achieved at an equivalence ratio of 2.0, where the carbon, cold gas and hot gas efficiencies were 83, 45 and 75%, respectively. The corresponding product gas heating value was 70 BTU/scf. A macroscopic model of coal combustion in the cyclone has been developed. Fuel-rich gasification can also be modeled through a gas-phase equilibrium treatment. Fluid mechanics are modeled by a particle force balance and a series combination of a perfectly stirred reactor and a plug flow reactor. Kinetic treatments of coal pyrolysis, char oxidation and carbon monoxide oxidation are included. Gas composition and temperature are checked against equilibrium values. The model predicts carbon efficiency, gas composition and temperature and reactor heat loss; gasification parameters, such as cold and hot gas efficiency and make gas heating value, are calculated for fuel-rich conditions. Good agreement exists between experiment and theory for conditions of this investigation. (ERA citation 05:012919)

FE-2335-T1 PC **A12**/MF **A01**
Engelhard Minerals and Chemicals Corp., Edison, NJ. Engelhard Industries Div.
Catalyst Development for Coal Liquefaction. Final Report, July 1, 1976-December 31, 1978.
S. G. Hindin. Jan 79, 265p
Contract EX-76-C-01-2335

The goal of this program is the development of an improved catalyst for coal liquefaction. Catalyst supports, hydrothermally stable at coal liquefaction conditions, were prepared with varying acidities to determine whether this parameter is critical to coal liquefaction and heteroatom removal. Other supports, primarily aluminas, were prepared with widely different pore-size distributions to study the effect of catalyst structure and composition of the support surface. Physical studies of catalysts and supports included measurements of surface area, pore-size distribution and pore-volumes. A technique was developed to measure the acidity of catalysts and supports by programmed desorption of adsorbed bases (ammonia and pyridine). Tests were set up to determine physical stability of catalysts (i.e., abrasion resistance, crush strength and resistance to disintegration in hot oil). An autoclave screening unit was constructed, and a test development program carried out to define the test conditions required for evaluation of catalyst performance. A large number of catalysts were evaluated in the autoclave screening unit. A fixed-bed reactor was designed and commissioned and an operating procedure developed. This type of continuous operation appears to be a practical solution for intermediate catalyst evaluation. Results indicate higher benzene-soluble yields for a large pore preparation and comparable, but more stable performance, than the H-Coal catalyst for a smaller pore, denser catalyst. (ERA citation 05:011088)

FE-2489-48 PC **A12**/MF **A01**
Institute of Gas Technology, Chicago, IL.
Development of Combustion Data to Utilize Low-Btu Gases as Industrial Process Fuels. Project 61004 Final Report.
R. T. Waibel, and E. S. Fleming. Aug 79, 251p
Contract EX-76-C-01-2489

Combustion data for three low-Btu gases - along with that of natural gas - demonstrated the feasibility of retrofitting existing burner equipment to the use of low-Btu gases. The low-Btu fuel gases used were Koppers-Totzek oxygen (KTO) (287 Btu/SCF), Wellman-Galusha air (WGA) (160 Btu/SCF), and Winkler air (WA) (116 Btu/SCF). The burners, representing a broad cross section of industrial burner types, were forward-flow baffle, kiln, nozzle-mix, high-forward-momentum, flat-flame, high-excess-air, premix tunnel, and gun-type boiler burner. Except for the kiln and boiler burners, which were scaled-down versions, all of the others were full-scale commercial burners designed for natural gas. Each burner was first fired with natural gas in a pilot-scale furnace with the furnace load adjusted to simulate the conditions under which the burner is typically used. Data were then gathered for each fuel in terms of flame stability, flame length and shape, thermal efficiency, furnace load heat absorption profile, noise level, furnace temperature profiles, radiant heat flux, post-flame emissivities, and flow direction. The 287 Btu/SCF KTO fuel gas compared most favorably with natural gas. KTO fuel gas from an oxygen blown gasifier would make a good substitute when retrofitting

burner equipment designed for natural gas. WGA and WA fuel gases from air blown gasifiers are not as good a substitute because of flame stability and thermal efficiency problems. (ERA citation 05:012925)

FE-2537-10 PC **A06/MF A01**
Oklahoma State Univ., Stillwater. Dept. of Chemistry.
Consequences of the Mass Spectrometric and Infrared Analysis of Oils and Asphaltenes for the Chemistry of Coal Liquefaction. Characterization of Coal-Derived Liquids and Other Fossil Fuel Related Materials Employing Mass Spectrometry.
P. A. Benson, S. E. Scheppele, G. J. Greenwood, T. Aczel, and Q. G. Grindstaff. Sep 79, 120p
Contract EX-76-S-01-2537

A COED liquid was separated into oils, asphaltenes, and residue. Anion- and cation-exchange chromatography fractionated the oils and asphaltenes into acids, bases, and neutrals; silica-gel chromatography separated neutral fractions into saturate and aromatic concentrates. Infrared spectra of the aromatic concentrates identified functional groups. Carbon-number distributions for the aromatic concentrates were obtained using high- and low-resolution FI/MS and high-resolution 70-eV EI/MS and ultra high-resolution low-voltage EI/MS. Excellent agreement exists between the MS analyses. The asphaltenes contain higher molecular weight Z series, higher molecular weight homologs and different compound types than do the oils. However, compound types are observed in both fractions which are equivalent in molecular formula and, hence, assumably in molecular structure. Furthermore, the overlap in compositions is appreciable. Although oils and asphaltenes are generally considered to be key intermediates in coal liquefaction, our results show that simple solvent extraction produces compositionally nonunique fractions. Thus, detailed molecular analysis is a prerequisite for the correct assessment of (1) reaction conditions and catalyst on the mechanism and kinetics of coal liquefaction and (2) alteration in process conditions on the quality of the coal liquid. (ERA citation 05:012951)

FE-2666-T2 PC **A03/MF A01**
Brigham Young Univ., Provo, UT. Dept. of Chemical Engineering.
Mixing and Gasification of Coal in Entrained Flow Systems. Quarterly Technical Progress Report No. 9, April 1-June 30, 1979.
L. D. Smoot, and P. O. Hedman. 15 Jul 79, 34p
Contract EF-77-S-01-2666

This report summarizes work to investigate the mixing and gasification of coal in entrained flow systems. Seven additional check-out tests have been performed with the coal gasification reactor. Tests were performed to investigate isokinetic sampling procedures. Additionally, problems relating to the bursting of the sample bag within the steel sample container, reduction of air contamination of gas samples, quantification of CO sub 2 absorption in the quench water, and determination of the gaseous sample volume were solved. Analytical chemical procedures using selective ion electrodes were devised to measure the amounts of sulfide, cyanide, and ammonia which are dissolved in the sample probe quench water. Thirteen final cold-flow mixing tests and several check-out tests of the swirl block hardware were conducted. Five tests, which used coal-dust as the particulate phase, completed the set of coal dust tests. Eight tests were conducted with the swirl hardware at the standard test conditions but with the swirl number set to zero; five of these were completed without the quarl installed while three were with the quarl installed. Preliminary analysis indicate that the presence of the swirl generator, even with zero Swirl Number, causes significant increases in the gas mixing rates. Methods of including particle drag effects, and pollutant formation predictions as well as improving the computational efficiency of the one-dimensional code (1-DICOG) have been investigated. The final draft of documentation for the one-dimensional model and a detailed user's manual were completed. Documentation of the two-dimensional, axi-symmetric, gaseous reaction model has also been completed. Extension of this model to coal-fired gasification has continued. (ERA citation 05:012927)

FE-2727-6 PC **A03/MF A01**
Mississippi Univ., University. Dept. of Chemical Engineering.
Mass Transport Characteristics of Zeolite Cracking Catalysts. Quarterly Report, January 1-March 31, 1979.
H. W. Haynes, Jr. 14 May 79, 40p
Contract EF-77-S-01-2727

An active zeolite hydrocracking catalyst has been prepared by ion exchanging Ni exp ++ onto an ammonium ultrastable zeolite Y and then impregnating the resulting catalyst with tungsten. A mixture of hydrogenated phenanthrenes were hydrocracked over this catalyst in a trickle bed reactor over a range of conditions: P = 1500 to 2000 psi, T = 650 to 750 exp 0 F, SV = 0.5 to 3.0 gm/hr/gm. Operability was generally good for the entire 131 hour run duration. The products will be analyzed by gas chromatography with selected products analyzed by GC/MS. A kinetics model has been developed for the simulated catalytic cracking of various pure hydrocarbons over zeolite NaY. Over the range of concentrations studied, hydrogenation prevails over cracking for partially saturated species like tetralin. The opposite is true for totally saturated naphthenic species such as decalin. However, the kinetic model predicts a higher selectivity toward cracking in a 100% vapor phase (no carrier gas) environment at atmospheric pressure. Tests are underway to check this prediction experimentally. From the magnitude of the activation energies and the relative activities for conversion over NaA and NaY, there does not appear to be any evidence of a pore diffusion limitation for the 3-ring and smaller components studied. (This conclusion may not apply to conventional catalytic cracking processes, however, since the conversion rates over NaY are orders of magnitude smaller than rates over acid forms of the zeolite.) Unexplained discrepancies still exist between theory and experiment in the GC-diffusivity studies on the system n-butane/NaY. Further tests are planned to check the linearity assumptions inherent in the model. (ERA citation 05:011091)

FE-2729-7 PC **A03/MF A01**
Brigham Young Univ., Provo, UT.
Alloy Catalysts with Monolith Supports for Methanation of Coal-Derived Gases. Quarterly Technical Progress Report, March 21-June 20, 1979.
C. H. Bartholomew. 5 Jul 79, 46p
Contract EF-77-S-01-2729

Significant progress was made in several task areas, but especially in the investigations of high pressure kinetics and deactivation by sulfur poisoning. Seventeen new catalysts were prepared for use in kinetic studies and long term tests. A number of catalysts were characterized using H sub 2 and CO adsorption and transmission electron microscopy. Activity tests were conducted for a borohydride reduced catalyst and samples of crushed and uncrushed monolithic nickel catalyst. Extensive kinetic experiments were performed on two monolithic nickel catalysts over a range of temperatures and pressures from which kinetic parameters and a rate expression were obtained. Long term experiments of H sub 2 S poisoning during reaction were also conducted and the data were fitted to a Levenspiel deactivation kinetics model. (ERA citation 05:012928)

FE-3048-3 PC **A03/MF A01**
Atomics International Div., Canoga Park, CA. Energy Systems Group.
Molten Alkali Metal Hydroxide Catalyzed Coal Liquefaction. Quarterly Technical Progress Report, April-June 1979.
R. P. Skowronski, and L. A. Heredy. Jul 79, 41p
Contract ET-78-C-01-3048

This is the third quarterly report on the investigation of a molten, alkali-metal-hydroxide-catalyzed coal liquefaction concept. The approach emphasizes maximizing liquid yields, especially distillate liquids, maximizing heteroatom removal, and minimizing gas production and hydrogen consumption. The effort consists of a laboratory test program to evaluate coal feedstocks, determine the effects of eight operating parameters on the production of liquids, and evaluate potential materials of construction. This quarter's liquefaction experiments have emphasized the fact of low catalyst-to-coal ratio. The experiments using low emounts of catalyst have indicated that impregnation is not an advisable method of contacting the coal with the catalyst. Other methods of contacting, such as coal injection, are presently being tested. We have developed a coal injection system coupled with rapid cooldown techniques and have demonstrated that a well defined reaction time can be obtained. The corrosion test will provide information on the corrosion-resistance of several Inconel alloys in sulfur-containing molten alkali metal hydroxide under coal liquefaction conditions. (ERA citation 05:012960)

GFETC/RI-79/1 PC **A04/MF A01**
Department of Energy, Grand Forks, ND. Grand Forks Energy Technology Center.
Reduction of Sodium in Lignite by Ion Exchange: A Pilot Plant Study.
L. E. Paulson, and R. C. Elliman. 1979, 54p

The variables in removing sodium from lignite by ion exchange were studied in pilot plant tests in which a possible commercial technique was simulated. Data show that sodium was reduced in 1/2 by 0-inch lignite from 7 pct to 3 to 4 pct by contact with a CaCl sub 2 solution for several hours. Sodium is a principle contributor to fireside tube fouling in lignite-burning powerplants. Fouling tendencies using ion-exchanged lignite were markedly reduced. (ERA citation 05:012902)

ISM-247 PC **A03/MF A01**
Ames Lab., IA.
Pyrite Desulfurization by Wet Oxidation in Alkaline Solutions.
K. C. Chuang, M. C. Chen, R. T. Greer, R. Markuszewski, and Y. Sun. 1979, 26p CONF-791108-14
Contract W-7405-ENG-82
72. AICHE meeting, San Francisco, CA, USA, 25 Nov 1979.

Particles of iron pyrites can be desulfurized by leaching them with a hot alkaline solution containing dissolved oxygen under pressure. As the reaction proceeds, sulfur is extracted largely as soluble sulfates and a shell of iron oxide is formed around a shrinking core of pyrite. The overall rate of the reaction seems to be controlled by diffusion of dissolved oxygen through the shell of iron oxide. (ERA citation 05:011044)

LA-UR-80-184 PC **A02/MF A01**
Los Alamos Scientific Lab., NM.
High Temperature Thermochemical Hydrogen Cycles for Solar Heat Sources.
M. G. Bowman. 1979, 16p CONF-791143-3
Contract W-7405-ENG-36
Users Association solar fuels workshop, Albuquerque, NM, USA, 28 Nov 1979.

Some of the criteria required for high temperature thermochemical hydrogen cycles to couple efficiently with solar heat sources are defined. Some of the experimentally validated cycles that have been developed over the years in terms of these criteria are examined and potential cycles that are being considered for the higher temperatures potentially available from solar concentrators are discussed. Cycles discussed include oxide-sulfate cycles, halide hydrolysis cycles, direct decomposition of H sub 2 O and CO sub 2 , oxide cycles, and sulfuric acid-metal sulfate cycles. (ERA citation 05:013368)

LBL-10093 PC **A02/MF A01**
California Univ., Berkeley. Lawrence Berkeley Lab.
Pretreatment of Biomass Prior to Liquefaction.
L. L. Schaleger, N. Yaghoubzadeh, and S. Ergun. 7 Nov 79, 9p
Contract W-7405-ENG-48

The hydrolytic pretreatment of wood flour (prepared at Albany from Douglas Fir chips) using 500 ppM sulfuric acid is sometimes ineffective because neutralization of acid occurs during the reaction. This phenomenon has been investigated and is tentatively ascribed to the presence of base-forming impurities. The problem can be overcome by using higher concentrations of acid, e.g., 1000 ppM. The final concentration of insoluble solids in a pretreated wood slurry prepared from a 1-to-4 mixture of wood-to-water is about 15%. The solids

in these pretreated slurries settle at rates on the order of 10 exp -2 ft/sec. These slurries are therefore still unsuitable for pumping in a slow, laminar flow system such as the one at Albany. However, two options for retarding settling appear promising. In the first, the pretreated slurry is homogenized by blending with air using a high speed mixer. In the second, a pretreated slurry prepared from chips is passed through a conventional disc refiner. This report focusses on the problem of pH control. (ERA citation 05:011417)

LBL-10118 PC **A02**/MF **A01**
California Univ., Berkeley. Lawrence Berkeley Lab.
Coal Desulfurization Prior to Combustion.
J. Wrathall, T. Vermeulen, and S. Ergun. Nov 79, 20p
Contract W-7405-ENG-48

Since current coal cleaning processes remove only a fraction of the total sulfur, the question arises as to what fraction of US coals can be cleaned within current EPA new source standards (1.2 lb. SO sub 2 per MMBTU). A number of studies has shown the fraction to be encouragingly large. A report on the applicability of the Meyers process estimates, on the basis of 35 coals sampled, that 40% of the samples could be burned cleanly after some combination of physical separation and chemical leaching. A report by Ergun on coal cleaning gives the higher estimate of cleanability of 56%, based on 455 samples properly weighted between Eastern and Western coals. Beyond this figure, Ergun estimates an additional 17% is cleanable if 30 to 40% of the organic sulfur is removed, bringing the total cleanable to 73%. Data from a study by Cavallaro, with coal reserves taken from a study by Beekers, give an estimate in agreement with that of Ergun on the amount of coal cleanable by pyrite removal. In summary, cleanable coal reserves increase by 33% if processes are used which can remove what are probably the more reactive organic sulfur species, such as aliphatic mercaptans, sulfides, and disulfides. A process which attacks the refractor thiophenic sulfur could conceivably increase the cleanable coal reserves by another 20 to 30%, assuming roughly equal distribution between reactive and refractory organic sulfur. (ERA citation 05:012903)

LBL-10282 PC **A05**/MF **A01**
California Univ., Berkeley. Lawrence Berkeley Lab.
Coal Liquefaction Using Zinc Chloride Catalyst in an Extracting Solvent Medium.
S. A. Gandhi, and A. T. Bell. Jan 80, 97p
Contract W-7405-ENG-48
Thesis.

Coal liquefaction was studied in a stirred autoclave using zinc chloride catalyst in a cyclohexane solvent medium. Three different coals were investigated: SRC-I, Wyodak subbituminous coal, and Illinois number 6 bituminous coal. Studies on the effect of reaction time indicate that the solubility of Wyodak coal increased linearly up to 2 hours, while the solubility of SRC-I was nearly constant after 1 hour. Increasing reaction temperature from 250 exp 0 C to 400 exp 0 C was found to linearly increase the yield of soluble products. Hydrogen pressure had a lesser effect on the yield, but the presence of gaseous hydrogen was necessary to produce a high cyclohexane solubility. Studies with co-catalysts indicated that Zn metal, NiS, and AlCl sub 3 in combination with zinc chloride were all incapable of increasing the yield of oil like products. In contrast, Ni metal acted more favorably and increased yields were obtained using Ni/ZnCl sub 2 catalyst mixtures. Methanol, ethanol, and isopropanol additives in the presence of zinc chloride increased the solubility of coal in cyclohexane. Further studies revealed that pre-impregnation of the catalyst into the coal from methanol solution was unnecessary and that catalyst to coal contacting did not limit the rate of reaction. Studies on the effect of solvent volume indicated that increasing the solvent/coal ratio had no effect on the reaction yield. Finally, the use of benzene as the extracting solvent resulted in higher yields of extractable products, exhibiting lower H/C and H/sub al//H/sub ar/ ratios compared to cyclohexane extracts. (ERA citation 05:012961)

LETC/RI-79/10 PC **A03**/MF **A01**
Department of Energy, Laramie, WY. Laramie Energy Technology Center.
Simulated In Situ Retorting of Oil Shale in a Controlled-State Retort. II. Heat Soaking Experiments.
J. J. Duvall. Dec 79, 26p

Oil shale from the Green River formation has been retorted in three experiments under closely controlled conditions in the controlled-state retort using a very slow heating rate (2.4 exp 0 F/h). In two of the experiments, all of the shale was retorted and in the third, the bottom 40% of the shale was left unretorted. The oil yield was less than 70% of Fischer Assay for the completed experiments and residual carbon content was higher because of the slow heating rate. Nitrogen and sulfur content of the oils washed from the shale of the interrupted experiment and of the periodic oil samples taken at the retort outlet during the experiment indicate either that nitrogen is more prevalent in the last oils released from the shale and sulfur is prevalent in the first oil released or that there is a chromatographic effect on the oil as it passes over the unretorted shale. Also the amount of bitumen extractable from the partially retorted shale of the interrupted experiment peaks at a lower temperature than for shales retorted at faster heating rates. These data imply that operators of vertical modified in situ retorts can expect higher concentrations of nitrogen in the oil product at the end of their retort burns and that shale retorted at the fringes of retorts will give lower than ideal yields. (ERA citation 05:013104)

LETC/RI-79/9 PC **A02**/MF **A01**
Department of Energy, Laramie, WY. Laramie Energy Technology Center.
Stratigraphic Variation of Oil Shale Enthalpy of Retorting Through the Green River Formation on the Colorado C-a Tract.
D. R. : Smith, J. W. Johnson, and N. B. Young. Dec 79, 18p

The importance of mineral enthalpies for oil shale retorting energy requirements has been largely ignored. A differential scanning calorimetry study of 18 alternating rich and relatively lean oil-yield zones from a core from the Colorado C-a tract shows that mineral enthalpies exceed organic enthalpy in each of the 18 zones. In addition, mineral enthalpy variations are greater than the variations produced by the organic contents of oil shales that have potential oil yields from 7.1 to 31.4 gallons per ton oil shale. Oil shale minerals identified in samples for the study are nahcolite, dawsonite, analcime, magnesian siderite, pyrite, dolomite, illite, quartz, and feldspar. (ERA citation 05:013110)

LETC/RI-80/1 PC **A03**/MF **A01**
Department of Energy, Laramie, WY. Laramie Energy Technology Center.
Simulated In Situ Combustion Retorting In Fractures Between Large Blocks of Oil Shale.
J. J. Duvall. Jan 80, 42p

True in situ combustion retorting of oil shale in fractures has been simulated in six experiments by igniting the common surfaces between two instrumented blocks of oil shale. Experimental details are given for all experiments although only one of the six experiments became self-sustaining. Three ignition systems were used involving heating the injected gas, heaters between the blocks and heaters in the blocks. The data obtained allow estimation of the heating rates of the oil shale at various places, the rate of combustion zone movement, the amount of shale retorted, and the width of the combustion front. The data show that the fracture between the blocks can be closed down by condensed or coked oil, shale swelling, shale spallation, and shale fusion. Results indicate that longer blocks would be desirable in further experimentation. 18 figures, 7 tables. (ERA citation 05:013105)

LETC-10787-31 PC **A08**/MF **A01**
Geokinetics, Inc., Concord, CA.
Investigation of the Geokinetics Horizontal In Situ Oil Shale Retorting Process. Quarterly Report, April-June 1979.
S. G. Mankowski. Aug 79, 175p
Contract ET-78-C-03-1787

Drilling and blasting activities for Retorts No. 20, 21, and 22 are reported. The burn of Retort No. 10 was terminated after 100 days of operation. Retort No. 17 was ignited on June 7, 1979 after preliminary pumpdowns. Environmental and socio-economic impact studies are reported. (ERA citation 05:013103)

N80-20404/3 PC **A06**/MF **A01**
Kentucky Univ., Lexington. Inst. for Mining and Minerals Research.
Experimental Laboratory Measurement of Thermophysical Properties of Selected Coal Types.
Final Report.
W. G. Lloyd. 13 Sep 79, 113p NASA-CR-162913, JPL-9950-317
Contracts NAS7-100, JPL-955381
Prepared for JPL.

A number of bituminous coals of moderate to high plasticity were examined, along with portions of their extrudates from the JPL 1.5-inch 850 F screw extruder. Portions of the condensed pyrolysis liquids released during extrusion, and of the gaseous products formed during extrusion were also analyzed. In addition to the traditional determinations, the coals and extrudates were examined in terms of microstructure (especially extractable fractions), thermal analysis (especially that associated with the plastic state), and reactivity towards thermal and catalyzed hydroliquefaction. The process of extrusion increases the fixed carbon content of coals by about 5% and tends to increase the surface area. Coals contaning 25% or more DMF-extractable material show an increase in extractables as a result of extrusion; those initially containing less than 20% extractables show a decrease as a result of extrusion. Both the raw and extruded samples of Kentucky no. 9 coal are highly reactive towards hydroliquefaction, undergoing conversions of 75 to 80% in 15 min and 85-94% in 60 min in a stirred clave.

ORO-5912-T1 PC **A03**/MF **A01**
Puerto Rico Univ., Mayaquez. Agricultural Experiment Station.
Production of Sugarcane and Tropical Grasses as a Renewable Energy Source. Third Quarterly Report, December 1, 1978-February 28, 1979.
A. G. Alexander, W. Allison, and M. Garcia. 1979, 45p
Contract ET-78-S-05-5912

Research continued on candidate screening, water and nitrogen regimes, and ratoon-crop performance for row-spacing, harvest frequency, and varietal variables. Greenhouse tests revealed several grasses having growth and drouth-tolerance characteristics superior to Sordan 70A, the project's outstanding short-rotation candidate up to this time. Johnson grass (Sorghum halepense), regarded as a weed by PR farmers, gave very favorable growth performances under simulated arid and semi-arid conditions. At six months into Year 2, first ratoon data for sugarcane and napier grass indicate yield increases of 33% and 4%, respectively, over plant crop yields. NCo 310 is emerging as the outstanding sugarcane variety tested to date. There are no consistent responses to narrow row spacing. Frequent recutting (at 2-month intervals) is gradually destroying sugarcane but is not appreciably affecting napier grass. Preliminary field-scale operations were begun with performance tests on a Mathews Company rotary scythe. (ERA citation 05:012593)

PATENT-4 193 827 Not available NTIS
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, OH.
Atomic Hydrogen Storage.
Patent,
J. A. Woollam. Filed 29 Sep 77, patented 18 Mar 80, 3p N80-20402/7, PAT-APPL-837 794 NASA-CASE-LEW-12081-2
Supersedes PAT-APPL-837 794-77, N78-19907 (16 - 10, p 1365). Division of U.S. Patent Appl. Sn-67432, Filed 13 Apr. 1976, US Patent-4,077,788. This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC. 20231 $0.50.

Atomic hydrogen, for use as a fuel or as an explosive, is stored in the presence of a strong magnetic field in exfoliated layered compounds such as molybdenum disulfide or an elemental layer material

such as graphite. The compound is maintained at liquid temperatures and the atomic hydrogen is collected on the surfaces of the layered compound which are exposed during delamination (exfoliation). The strong magnetic field and the low temperature combine to prevent the atoms of hydrogen from recombining to form molecules.

PB80-173552 PC **A07**/MF **A01**
Office of Technology Assessment, Washington, DC.
Alternative Energy Futures. Part I. The Future of Liquefied Natural Gas Imports.
Mar 80, 133p OTA-E-110
See also report dated Sep 77, PB-273 486.

This assessment is in response to a request by the Senate Committee on Finance for an evaluation of the economic and energy implications of any future liquefied natural gas imports. Included in the study are: a discussion of worldwide availability of natural gas for U.S. import as LNG in the context of projected U.S. gas demand, alternative North American oil and gas resources, and the security of foreign supplies. The report also includes sections on LNG project structure, cost, and financing with observations about balance-of-payment impacts and public exposure to financial risk. An analysis of the behavior of gas markets in determining who receives additional supplies by virtue of LNG projects, and who pays for them, illustrates some of the practical effects of the Natural Gas Policy Act of 1978.

PB80-810039 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Underground Coal Gasification. 1964-1978 (Citations from the NTIS Data Base).
Rept. for 1964-1978,
Diane Cavagnaro. May 80, 242p
For the companion Published Search of the Engineering Index Data Base, see PB80-810054.

Research reports on in-situ coal gasification are cited. Some of the techniques include rock fracturing, combustion, gas removal, economic, costs, and environmental factors. (This updated bibliography contains 235 abstracts, none of which are new entries to the previous edition.)

PB80-810047 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Underground Coal Gasification. 1979-April, 1980 (Citations from the NTIS Data Base).
Rept. for 1979-Apr 80,
Diane M. Cavagnaro. May 80, 100p
Supersedes NTIS/PS-79/0481 and NTIS/PS-78/0485. For the companion Published Search of the Engineering Index Data Base, PB80-810054.

The bibliography of Federally-sponsored research cites many aspects of in-situ gasification techniques, including rock fracturing, combustion, gas removal, economics, costs, and environmental factors. (This updated bibliography contains 93 abstracts, 53 of which are new entries to the previous edition.)

PB80-810054 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Underground Coal Gasification. 1970-April, 1980 (Citations from the Engineering Index Data Base).
Rept. for 1970-Apr 80,
Diane M. Cavagnaro. May 80, 276p
Supersedes NTIS/PS-79/0482, NTIS/PS-78/0486, NTIS/PS-77/0478, and NTIS/PS-76/0408. For the companion Published Searches of the NTIS Data Base, see PB80-810039 and PB80-810047.

The bibliography presents worldwide research pertaining to underground (in-situ) coal gasification. It includes environmental effects, the different processes and techniques that are used, gas removal, rock fracturing, costs, and economics. (This updated bibliography contains 269 abstracts, 106 of which are new entries to the previous edition.)

PB80-928108 PC **E02**/MF **A01**
Central Intelligence Agency, Washington, DC.
Central Siberian Brown Coal as a Potential Source of Power for European Russia.
Research paper.
Apr 80, 12p SW-80-10006
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The Soviets are exploring several technologies for using low-grade Siberian brown coal as a supplemental power source for the Western USSR; the most promising option appears to be the manufacture of semicoke and shipping it by rail to Western USSR. Implementation of this option would take 10 to 15 years, however, and Soviet planners may have to look seriously at other alternatives.

PETC-10574-6 PC **A05**/MF **A01**
Texas A and M Univ., College Station.
Rheological Properties of Methacoal Suspensions Formulated from Texas Lignite. Final Report.
R. Darby. Aug 79, 81p
Contract EF-77-G-01-2725

Rheological properties of Methacoal suspensions were evaluated as a function of shear rate, solids volume fraction, particle size distribution, and initial lignite moisture content. The suspensions were mostly quite stable, highly shear thinning, and the apparent viscosity increased exponentially with solids fraction. The viscosity data were fit by various models, and the model parameters were found to correlate with the fraction of fines in the suspension. Final correlations showed the apparent viscosity to be a minimum at a particular fraction of fines in suspension, the value of which depends upon the shear rate. The extent of this minimum is more pronounced as the lignite moisture content is reduced. Stable Methacoal suspensions were less compact and more fluid than comparable water suspensions. It was demonstrated that larger quantities of Methacoal suspensions with good stability and flow properties could be produced using a continuous Dispax homogenizer. Representative tube flow data were obtained for some of these suspensions in a specially constructed tube flow viscometer in laminar flow, which increased the effective range of viscosity measurements by over an order of magnitude. A bench scale pipe flow facility has been constructed incorporating eight tubes with diameters up to 1 1/2 in., each 40 ft. long, capable of obtaining data in the turbulent flow range as well. This facility can operate either continuously using a centrifugal slurry pump, or on a once through basis using pressurized air drive. (ERA citation 05:011193)

RHO-CD-829 PC **A07**/MF **A01**
Atomics International Div., Richland, WA. Rockwell Hanford Operations.
Wood Pellet Feasibility Study.
C. H. Dohrer. 31 Oct 79, 133p
Contract EY-77-C-06-1030

This study effort was undertaken to determine the feasibility of using pelletized wood as an alternative fuel supply while retaining the capabilities of returning to the use of coal without interrupting steam production. Pelletized wood fuel was fired in two of four boilers rated at 80,000 pounds of steam per hour each. No modifications to the existing systems were required in order to conduct the study. Wood pellets can be fired efficiently at up to 85 percent of boiler capacity without exceeding particulate emission or opacity standards which eliminates the need for gas control exhaust measures. The lower ash volume of wood pellets can produce a 75 percent savings in ash handling and disposal costs. The need for additional receiving, storage and conveyance facilities for dust control and reduction of the fire and explosion hazards presented by wood pellets cannot be justified by savings in fuel or operating costs. The estimated yearly delivered cost of wood pellets to Hanford exceeds the known yearly delivered cost of the equivalent Btu value of coal. The increased operating costs incurred by firing wood pellets are not offset by savings in ash handling and baghouse operating costs. Based on the capital cost of additional facilities for wood pellets and increased operating cost while using this fuel in lieu of coal, the use of wood pellets as an alternative to coal in the 200 West Area powerhouse is not economically feasible at this time. Wood pellet and coal prices should, however, remain under observation and the option of firing wood pellets be reviewed if a change in cost dictates an economic advantage. It is recommended that steam plants faced with expensive emission improvements or high fuel costs seriously consider the use of wood pellets as a substitute fuel. (ERA citation 05:013227)

SAND-79-8636 PC **A02**/MF **A01**
Sandia Labs., Livermore, CA.
Overall Efficiencies for Conversion of Solar Energy to a Chemical Fuel.
J. D. Fish. 1979, 22p CONF-791204-9
Contract EY-76-C-04-0789
Miami international conference on alternative energy sources, Miami Beach, FL, USA, 10 Dec 1979.

A complete and consistent schema for determining the overall efficiency of a generalized process for the conversion of solar energy into a chemical fuel is developed and applied to seven conversion processes: conversion of concentrated sunlight to electricity in a conventional thermal cycle followed by hydrogen production via water electrolysis; thermochemical conversion with concentrated solar energy as the heat source; photovoltaic conversion to electricity followed by water electrolysis; photogalvanic conversion to electricity followed by water electrolysis; direct photoelectrolysis of water; natural photosynthesis followed by pyrolysis or digestion of the biomass to convert it to a more convenient form; and direct photochemical production of hydrogen or some other chemical that is capable of undergoing exothermic conversion back to the starting material. It is demonstrated that the overall efficiency of each of these processes is determined by ten common factors; maximum theoretical efficiency; inherent absorption losses; inherent internal losses; rate limiting effects; reflection losses; transmission losses; coverage losses; system construction requirements; parasitic losses; and harvesting and conversion losses. Both state-of-the-art and optimistic values are assigned to each factor for each of the seven conversion processes. State-of-the-art overall efficiencies range from 5% for thermal conversion down to essentially zero for the undeveloped thermochemical and quantum processes. Optimistic values for overall efficiencies in the range of approx. 10 to 15% are calculated for several of the processes. Finally, candidate areas for research are identified by comparing state-of-the-art and limiting values for both the individual factors and the overall efficiencies. 41 references. (ERA citation 05:011583)

SAND-79-8646 PC **A04**/MF **A01**
Sandia Labs., Livermore, CA.
Technologies and Economics of Small-Scale Hydrogen Storage.
S. L. Robinson, and J. J. Iannucci. Dec 79, 51p
Contract EY-76-C-04-0789

Presently available and future fixed-site hydrogen storage technologies are examined, to identify the minimum cost storage technique for various combinations of quantity, cycling frequency and parasitic energy costs. The forms studied are, pressurized gas, cryogenic liquid, hydride, and microballoon storage. For each form, installed capital cost, filling and emptying equipment costs and parasitic energy costs are developed and parameterized by electric rates. The energy intensive systems are economical for long-term cycling (seasonal storage) but unfavorable for short term (daily cycling). Low-pressure gas storage is favored for short term and intermediate term storage. Development of microballoon storage is recommended as a possible low-cost long-term storage option. (ERA citation 05:011407)

SERI/RR-353-354 PC **A03**/MF **A01**
Solar Energy Research Inst., Golden, CO.
Agricultural Crop Residue Collection Costs.
J. Dauve, and S. J. Flaim. Dec 79, 26p
Contract EG-77-C-01-4042

Five different systems for collecting agricultural crop residues are examined: conventional bales, big round bales, big rectangular bales, stackwa-

gons, and loose chop. The stackwagon system had the lowest costs per ton for both a 400-acre corn harvest and a 750-acre wheat harvest. Big round bales are less expensive than the stackwagon system under certain circumstances. Big rectangular bales are competitive when larger acreages are harvested. Conventional bales appear competitive on small acreages where on-farm labor is not a constraint. Loose-chop harvesting systems are not feasible unless transportation distances are short. Custom rates for three systems (conventional bale, big round bale, and stackwagons) are examined to confirm the ordinate ranking of system costs. The custom rates and cost estimates are based on farms located in central Iowa and central Oklahoma, the sample farming situations that are examined in other research in the Analysis Division of SERI. Costs only represent costs for new equipment. These estimates do not represent average charges for the existing stock of harvesting equipment and do not reflect opportunity costs for other farm activities. (ERA citation 05:011579)

SERI/TP-33-409 PC **A02**/MF **A01**
Solar Energy Research Inst., Golden, CO.
Improved Hydrogen Photoproduction from Photosynthetic Bacteria and Green Algae.
P. F. Weaver, S. Lien, and M. Seibert. 1979, 21p
Contract EG-77-C-01-4042

Photosynthetic bacteria evolve hydrogen at much higher rates than do other classes of photosynthetic microorganisms. In addition, they tolerate harsh environments, grow rapidly, and utilize both visible and near infrared light in photosynthesis. They do not split water, but this does not necessarily eliminate their potential use in future applied systems. They are easily manipulated genetically, and thus might be modified to metabolize common biomass waste materials in place of expensive defined organic substrates. Furthermore, the potential for increasing hydrogen photoproduction via genetic techniques is promising. Strains that partially degrade cellulose, have high photoproduction rates, or contain very large amounts of the enzymes associated with hydrogen metabolism have been isolated. Green algae also produce hydrogen but are capable of using water as a substrate. For example, C. reinhardi can evolve hydrogen and oxygen at a molar ratio approaching 2:1. Based upon effect of dichlorophenyl dimethylurea (a specific inhibitor of photosystem II, PSII) on hydrogen photoproduction in the wild type strain and upon results obtained with PSII mutants, one can demonstrate that water is the major source of electrons for hydrogen production. The potential efficiency of in vivo coupling between hydrogenase and the photosynthetic electron transport system is high. Up to 76% of the reductants generated by the electron transport system can be channeled directly to the enzyme for in vivo hydrogen production. Rates exceeding 170 mu moles of H sub 2 mg Chl exp -1 hr exp -1 have been observed. (ERA citation 05:009744)

SERI/TP-33-410 PC **A02**/MF **A01**
Solar Energy Research Inst., Golden, CO.
Photobiological Hydrogen Production.
M. Seibert, S. Lien, and P. F. Weaver. 1979, 19p
Contract EG-77-C-01-4042

Hydrogen production by phototrophic organisms, which has been known since the 1930's, occurs at the expense of light energy and electron-donating substrates. Three classes of organisms, namely, photosynthetic bacteria, cyanobacteria, and algae carry out this function. The primary hydrogen-producing enzyme systems, hydrogenase and nitrogenase, will be discussed along with the manner in which they couple to light-driven electron transport. In addition, the feasibility of using in vivo and in vitro photobiological hydrogen producing systems in future solar energy conversion applications will be examined. (ERA citation 05:009745)

SERI/TP-332-495 PC **A02**/MF **A01**
Solar Energy Research Inst., Golden, CO.
Problems and Opportunities Fr Solar Energy in Biomass, Pyrolysis, and Gasification.
T. Reed. Nov 79, 12p
Contract EG-77-C-01-4042

Passive solar input for drying crops and wood already make a significant input to the US energy budget, and active solar drying, requiring temperatures below 200 exp 0 C, can easily make an important substitution for fossil fuels in drying. Pyrolysis of biomass typically requires less than 1.6 MBtu/dry ton at a temperature of 500 exp 0 C, and this could potentially be supplied by direct solar heating. The heat input is likely to be by indirect heating of a solid, liquid or gas heat-transfer agent. Fast pyrolysis requires modest heat inputs with high heat-transfer rates at temperatures over 900 exp 0 C and thus may be particularly suited to focusing collectors as energy sources. Char gasification, using steam or CO sub 2 , requires large energy inputs at temperatures over 900 exp 0 C and thus is the least likely field of application of solar energy. Ultimately, the large scale application of solar energy to biomass pyrolysis and gasification will depend on the relative cost of direct solar versus biomass inputs. Biomass energy inputs now typically cost 1 to 3 $/MBtu; when direct solar heat costs begin to approach this level, we may begin to use direct solar process heat for biomass conversion. (ERA citation 05:013369)

UCRL-52865 PC **A02**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Hydrogen Encapsulation in a Cs-Exchanged Type 4A Zeolite.
P. L. Turi, and J. F. Lakner. 24 Sep 79, 12p
Contract W-7405-ENG-48

H sub 2 encapsulation in a Cs-exchanged synthetic type 4A zeolite was observed. Hydrogen storage capacity v (in cm exp 3 H sub 2 (STP) per gram zeolite) was measured in samples in which Na exp + implies Cs exp + exchange was from 19 to 61%. The samples were loaded with H sub 2 at temperatures from 350 to 420 exp 0 C, at pressures up to 20,000 psi. In a sample with 43% exchange, loaded at 420 exp 0 C, H sub 2 storage capacity varied with loading pressure (in psi) as v = 0.018p exp 0 exp 82 . In sapmles loaded at 10,000 psi, 350 exp 0 C, storage capacity appeared to have a maximum at about 46% exchange (unit cell contents Cs sub 5 sub 5 Na sub 6 sub 5). (ERA citation 05:011406)

21E. Jet and Gas Turbine Engines

AD-A082 728/7 PC **A03**/MF **A01**
National Research Council of Canada Ottawa (Ontario) Div of Mechanical Engineering
The Influence of Blade Profile and Slots on the Performance of a Centrifugal Impeller (Influence du Profil de Pales et Fentes sur la Performance d'un Ventilateur Centrifuge),
H. S. Fowler. Jan 80, 46p DME-ME-248, NRC-18123
Summary in French.

As part of the program of studies on centrifugal impellers, the problem of instability at low flows was investigated. The major cause was found to be flow detachment from the impeller vanes. Slotted blades were found to be the most effective means of delaying this detachment, and extending the working range of the blower. Low speed studies were confirmed by a test program on a high speed machine, where it was demonstrated that the improved flow range was accompanied by a general increase of efficiency. The design and placement of the slots is discussed. (Author)

AD-A082 753/5 PC **A07**/MF **A01**
General Electric Co Lynn MA Aircraft Engine Group
High Bypass Turbofan Component Development. Phase II. Detailed Design.
Interim technical rept. 4 Oct 78-25 May 79,
H. Mauch, T. Oldakowski, and D. Weldon. Aug 79, 138p AFAPL-TR-79-2064
Contract F33615-78-C-2060
See also Phase 1, AD-B041 614L.

A detailed aerodynamic, aeromechanical and mechanical design of the high bypass turbofan fan stage selected during Phase I of this program was satisfactorily completed. This fan design is the result of aero and aeromechanical iterations and trade-offs which achieved the objectives of meeting aerodynamic performance as well as the life and mechanical considerations of MIL-E-5007D. The resulting fan design compares very closely to the fan originally proposed. (Author)

AD-A082 754/3 PC **A07**/MF **A01**
General Electric Co Cincinnati OH Aircraft Engine Group
Thermal Response Turbine Shroud.
Final rept. 26 Sep 78-28 Sep 79,
C. H. Gay. Nov 79, 149p AFAPL-TR-79-2108
Contract F33615-78-C-2071

The Thermal Response Turbine Shroud program studied and evaluated overall engine active clearance control designs and payoffs for a broad range of engine/aircraft combinations. Both turbine and compressor active clearance control systems were considered for gas turbine engines that encompassed high and low fan bypass ratios, single and two stage turbines, and commercial and military missions. The study of active clearance control included detailed material, heat transfer and thermal and mechanical growth analyses. The study effort looked at the active control of clearance at transient as well as steady state engine operation. The evaluation included an overall assessment of active clearance control benefits and penalties in both performance and cost for the particular aircraft/engine system studied. (Author)

AD-A082 821/0 PC **A04**/MF **A01**
General Motors Corp Indianapolis IN Detroit Diesel Allison Div
High Bypass Turbofan Component Development. Phase II. Fan Detail Design.
Final rept. Dec 78-Oct 79,
D. C. Chapman. Dec 79, 69p DDA-EDR-10026, AFAPL-TR-79-2103
Contract F33615-78-C-2014
See also Rept. no. AFAPL-TR-79-2034 dated May 79, AD-C019 346L.

The objective of this program is to develop an advanced, small, high bypass turbofan component applicable to an advanced, fuel-efficient engine for a new Air Force primary trainer aircraft. The program consists of two phases. Phase I consisted of the preliminary design and life cycle cost analysis of candidate engines. This report documents Phase II which was the detail design of the selected fan configuration. Primary design point of the fan is 1.8 pressure ratio at 55.9 lbm/sec flow. At a lower speed, the fan will produce 1.65 pressure ratio at a flow compatible with the GMA500 advanced technology core engine. The resultant engine satisfies all requirements of the contract. The fan stage meets all requirements of Mil-E-5007D, including bird ingestion and predicted noise levels are below FAR Part 36 requirements. (Author)

AD-A082 963/0 PC **A03**/MF **A01**
Foreign Technology Div Wright-Patterson AFB OH
Aerodynamic and Thermodynamic Characteristics of Supersonic Ramjet Engine with Mach Number between 3 and 7. Part II. Calculation and Analysis of Thermodynamic Properties,
Wu Chung-Hua, Liu Kao-Lien, Tiao Chen-Kang, and Liu Tien-Kuei. 17 Mar 80, 32p Rept no. FTD-ID(RS)T-0009-80-PT-2
Edited trans. of Revised Manuscript, (China) Sep 64 p1-22.

No abstract available.

DOE/NASA/1040-79/9 PC **A03**/MF **A01**
National Aeronautics and Space Administration, Cleveland, OH. Lewis Research Center.
Performance Sensitivity Analysis of Department of Energy: Chrysler Upgraded Automotive Gas Turbine Engine (S/N 5-4).
R. L. Johnsen. Dec 79, 37p NASA-TM-79242
Contract EC-77-A-31-1040

Performance sensitivities and interactions between gas turbine engine components were examined analytically when changes were made to several significant component performance and operating parameters. The gas turbine engine, a two-shaft configuration called the upgraded engine, was developed by the Chrysler Corporation under a US Department of Energy contract. The early upgraded engines had a serious power shortfall, and a cooperative effort was undertaken to remedy the problem. The performance sensitivity was examined for changes to several operating and component performance parameters. One change at a time was introduced, and the performance was calculated and then compared to the reference

performance. This comparison was made at gas generator speeds from 50 (idle speed) to 100%. Sensitivities were determined for changes in turbomachinery efficiency, compressor inlet temperature, power turbine discharge temperature (which was actively controlled), regenerator effectiveness, regenerator drop, and several gas flow and heat leaks.As expected, the efficiency of the compressor and the turbines strongly affected performance. Compressor efficiency, which had the strongest effect on system performance, was closely followed by compressor-drive turbine and power turbine efficiencies. Efficiency changes to either the compressor or compressor-drive turbine efficiencies resulted in a shift in the operating point of the other two machines. For constant shaft speeds and power turbine discharge temperature, increasing the compressor efficiency resulted in reduced pressure ratio for the compressor-drive turbine and increased pressure ratio for the power turbine. Changes to power turbine efficiency did not affect the operating point of the other two machines. A tabulation of influence coefficients for several dependent variables is included for gas generator speeds from 50 to 100%. (ERA citation 05:013854)

N80-20272/4 PC **A03**/MF **A01**
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, OH.
Effect of Water Injection and off Scheduling of Variable Inlet Guide Vanes, Gas Generator Speed and Power Turbine Nozzle Angle on the Performance of an Automotive Gas Turbine Engine.
E. L. Warren. Mar 80, 35p NASA-TM-81415, E-333
Contract EC-77-A-31-1040

The Chrysler/ERDA baseline automotive gas turbine engine was used to experimentally determine the power augmentation and emissions reductions achieved by the effect of variable compressor and power engine geometry, water injection downstream of the compressor, and increases in gas generator speed. Results were dependent on the mode of variable geometry utilization. Over 20 percent increase in power was accompanied by over 5 percent reduction in SFC. A fuel economy improvement of at least 6 percent was estimated for a vehicle with a 75 kW (100 hp) engine which could be augmented to 89 kW (120 hp) relative to an 89 Kw (120 hp) unaugmented engine.

N80-20273/2 PC **A05**/MF **A01**
Notre Dame Univ., IN. Dept. of Electrical Engineering.
Alternatives for Jet Engine Control.
Semiannual Status Report, 1 Sep. 1979 - 29 Feb. 1980.
M. K. Sain. 1980, 93p NASA-CR-162911
Grant NSG-3048

Nonlinear modeling researches involving the use of tensor analysis are presented. Progress was achieved by extending the studies to a controlled equation and by considering more complex situations. Included in the report are calculations illustrating the modeling methodology for cases in which variables take values in real spaces of dimension up to three, and in which the degree of tensor term retention is as high as three.

N80-20274/0 PC **A02**/MF **A01**
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, OH.
Jt9d-7A (Sp) Jet Engine Performance Deterioration Trends.
G. P. Richter, W. J. Olsson, and N. B. Andersen. 1980 24p NASA-TM-81459, E-388
Prepared in Cooperation with Pratt and Whitney Aircraft Group, East Hartford, Conn. And Pan American World Airways, Inc., Jamaica, N.Y. Presented at the Intern. Aircraft Maintenance Eng. Exhibition and Conf., Dallas, 8-10 Apr. 1980; Sponsored by Hamilton Burr Publishing CO.

The levels, trends, and causes of engine performance deterioration were investigated. A series of installed engine calibrations (both on-the-ground and in-flight) were performed on two new Pan American World Airways 747 SP aircraft. The performance data gathered covered from before the first flight through approximately 1000 flight cycles and 6900 flight hours. To accomplish the calibrations a special instrumentation system for ground testing of installed engines over a broad power range was used along with performing concurrent in-flight engine calibrations under revenue service conditions. Results of the analysis of the data, which provide a better understanding of short and long term performance deterioration of both engines and modules are presented.

N80-20553/7 PC **A05**/MF **A01**
Technische Univ., Berlin (Germany, F.R.). Inst. fuer Luft- und Raumfahrt.
A Calculating Technique for the Flow Field around a Hydraulic Turbine Ein Verfahren Zur Berechnung des Stroemungsfeldes Um Strahltriebwerke.
E. Goede. 1978, 97p ILR-37, ISBN-3-79830-651-6
Text in German.

The panel method is discussed in terms of minimizing the leakage effect when calculating liquid flows around a turbine. A choice of panels is given for specific sections which shows a correct representation of the flow. A mathematical model is presented which aids the best panel.

PATENT-4 199 175 Not available NTIS
Department of the Air Force Washington DC
Ribbed Flange Modified Seal.
Patent,
Arthur J. Paukune. Filed 28 Apr 78, patented 22 Apr 80, 4p AD-D007 159/7, PAT-APPL-900 950
Supersedes PAT-APPL-900 950-78, AD-D005 077.
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

The cylindrical sections of a gas turbine engine are provided with flanges at each end for bolting the sections to one another. Each flange includes a series of strengthening ribs of arcuate configuration extending axially outward from the center of the wall thereof between the several bolts needed to join the adjacent sections together. The ribs serve to eliminate the need for at least 2 out of 3 bolts while effectively maintaining the required stiffness and sealing capability. (Author)

PB80-175276 PC **A05**/MF **A01**
Purdue Univ., Lafayette, IN. Combustion Lab.
Emissions Correlations for Conventional Gas Turbines.
Final rept.,
R. M. Washam, and A. M. Mellor. Dec 77, 85p
PURDU-CL-77-06
Grant EPA-R-804443-01

The production of gaseous pollutants from conventional gas turbine combustors is being investigated through the use of a characteristic time model. Here, the dominant subprocesses (liquid fuel evaporation, turbulent mixing, and chemical reaction) affecting the formation and destruction of pollutant species are expressed in terms of times and then sums and ratios of these times are used to correlate emissions. Correlations are done for combustors of three engines (the General Motors GT-309, the Detroit Diesel Allison T-63, and the Pratt and Whitney JT9D); the model predicts the effect of combustor geometry, fuel type, power level, ambient conditions, etc. on the levels of pollutants produced. In addition, the model shows promise as an emissions optimization tool as demonstrated for the GT-309. And, there are indications that, for specific pollutants, universal correlations for all conventional gas turbine combustors can be performed with the model. Generally heterogeneous effects are ignored.

PB80-810112 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Turbine Blades: Erosion and Corrosion. 1964-March, 1980 (Citations from the NTIS Data Base).
Rept. for 1964-Mar 80,
Guy E. Habercom, Jr. May 80, 191p
Supersedes NTIS/PS-79/0148 and NTIS/PS-78/0144. For the companion Published Search of the Engineering Index Data Base, see PB80-810120.

Hostile environments to which turbine blades are exposed (i.e., liquid metals, high temperature, chemicals, etc.) are a direct cause of turbine parts erosion and/or corrosion. These Government-sponsored research reports describe sources of erosion/corrosion of turbine blades and suggest methods to eliminate or alleviate the problems. (This updated bibliography contains 184 abstracts, 19 of which are new entries to the previous edition.)

PB80-810120 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Turbine Blades: Erosion and Corrosion. 1970-February, 1980 (Citations from the Engineering Index Data Base).
Rept. for 1970-Feb 80,
Guy E. Habercom, Jr. May 80, 228p
Supersedes NTIS/PS-79/0149 and NTIS/PS-78/0145. For the companion Published Search of the NTIS Data Base, see PB80-810112.

Hostile environments to which turbine blades are exposed (i.e., liquid metals, high temperature, chemicals, etc.) are a direct cause of turbine parts erosion and/or corrosion. These reports, gathered in a worldwide literature survey, describe sources of erosion/corrosion of turbine blades and suggest methods to eliminate or alleviate the problems. (This updated bibliography contains 221 abstracts, 26 of which are new entries to the previous edition.)

21G. Reciprocating Engines

N80-20271/6 PC **A07**/MF **A01**
Teledyne Continental Motors, Muskegon, MI.
A 150 and 300 kw Lightweight Diesel Aircraft Engine Design Study.
Final Report.
A. P. Brouwers. Apr 80, 149p NASA-CR-3260, REPT-756
Contract NAS3-20830

The diesel engine was reinvestigated as an aircraft powerplant through design study conducted to arrive at engine configurations and applicable advanced technologies. Two engines are discussed, a 300 kW six-cylinder engine for twin engine general aviation aircraft and a 150 kW four-cylinder engine for single engine aircraft. Descriptions of each engine include concept drawings, a performance analysis, stress and weight data, and a cost study. This information was used to develop two airplane concepts, a six-place twin and a four-place single engine aircraft. The aircraft study consists of installation drawings, computer generated performance data, aircraft operating costs, and drawings of the resulting airplanes. The performance data show a vast improvement over current gasoline-powered aircraft.

PAT-APPL-6-091 227 PC **A02**/MF **A01**
Department of the Army Washington DC
Engine Simulator to Calibrate RPM and Cam-Dwell Test Sets.
Patent Application,
Charles M. Blackwell. Filed 5 Nov 79, 10p AD-D007 105/0
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A plurality of dividers, inverters and switching circuits provide for the generation of 33% or 66% cam-dwell angles and the simulation of 4, 6 or 8 cylinders with either a 2 or a 4 cycle engine. Switches are also provided for simulation of the RPM's. In designing the engine simulator, it was desired to have RPM outputs that would be sufficient to check RPM meters at low-, middle-, and full-scale of ranges. These RPM speeds established, to some extent, the numbers of dividers and the master clock frequency. Since the single cylinder RPM output to the HV spark circuit must be correct for given RPM, regardless of the number of cylinders (4, 6, or 8 and 2 or 4 cycle), switching of dividers in and out in certain combinations was required. The cam-dwell function is basically derived from a divide by two or three circuits that in all cases give the correct distributor RPM output for the selected engine. This also required switching of the divider circuits for different cylinder number engines. The divide by three normal or inverted output gives 33% or 66% cam-dwell angles, and

the divide by two gives 50% of cam-dwell angles. These three outputs provide all necessary ranges of cam-dwell for selected engine types. Since the frequency of the master clock is much higher and crystal controlled, the low-operating frequencies of RPM outputs are very accurate and the accuracy of cam-dwell, determined by bi-stable circuits, far exceeds any mechanical device being checked.

PB80-170012 PC **A03**/MF **A01**
Transportation Systems Center, Cambridge, MA.
Performance Characteristics of 1977 General Motors 350 CID Engine.
Final rept.,
Joseph Boziuk. Feb 80, 48p DOT-TSC-NHTSA-80-11, DOT-HS-805-222

Experimental data were obtained in dynamometer tests of a 1977 GM 350 CID engine to determine fuel consumption and emissions (hydrocarbons, carbon monoxide, and oxides of nitrogen) at steady-state engine operating modes. The objective of the test was to obtain engine performance data for estimating fuel consumption and emissions for varied engine service and duty and to provide basic engine characteristic data required for the TSC Vehicle Simulator (VEHSIM).

SAN-1865-T1 PC **A05**/MF **A01**
Combustion Electromagnetics, Inc., Lexington, MA.
Effects of Microwaves on the Performance of Internal Combustion Engines. Final Technical Report, March 1, 1978-May 31, 1979.
M. A. V. Ward. 30 Jun 79, 99p
Contract ET-78-C-03-1865

The project studied the interaction of microwave energy with both an ignition plasma as well as with a hydrocarbon-air flame plasma in order to ultimately assist lean mixture burn and increase flame speed of a hydrocarbon-air fuel mixture in the internal combustion engine. In achieving these goals, vehicular exhaust pollutants will be reduced and engine efficiency will be increased. (ERA citation 05:013831)

21H. Rocket Motors and Engines

N80-20303/7 PC **A07**/MF **A01**
Boeing Aerospace Co., Seattle, WA.
Technology Requirements for Future Earth-to-Geosynchronous Orbit Transportation Systems. Volume 3: Appendices.
Final Report.
V. A. Caluori, R. T. Conrad, and J. C. Jenkins.
Mar 80, 146p NASA-CR-159174
Contract NAS1-15301

Technological requirements and forecasts of rocket engine parameters and launch vehicles for future Earth to geosynchronous orbit transportation systems are presented. The parametric performance, weight, and envelope data for the LOX/CH4, fuel cooled, staged combustion cycle and the hydrogen cooled, expander bleed cycle engine concepts are discussed. The costing methodology and ground rules used to develop the engine study are summarized. The weight estimating methodology for winged launched vehicles is described and summary data, used to evaluate and compare weight data for dedicated and integrated O2/H2 subsystems for the SSTO, HLLV and POTV are presented. Detail weights, comparisons, and weight scaling equations are provided.

21I. Rocket Propellants

AD-A082 881/4 PC **A09**/MF **A01**
Politecnico Di Milano (Italy) Ist Di Macchine
The Dynamics of Solid Propellant Combustion.
Annual technical rept. no. 2, 31 Dec 77-30 Nov 79,
Luigi De Luca, Aldo Coghe, and Aldolfo Reggiori.
Sep 79, 196p
Grant DA-ERO-78-G-029

A nonlinear stability analysis of solid rocket propellant burning was carried out, within the framework of a thermal theory for thin (quasi-steady gas phase) heterogeneous flames. This required an integral method in reducing the partial differential equation for the condensed phase heat conduction to an approximate ordinary differential equation. A nonlinear algebraic function, called static restoring function, was found that contains all basic properties of equilibrium and stability of burning solid propellants.

N80-20304/5 PC **A02**/MF **A01**
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, OH.
Lerc Reduced Gravity Fluid Management Technology Program.
J. C. Aydelott, and E. P. Symons. 1980, 19p NASA-TM-81450, E-371
Prepared for the 1980 Jannaf Propulsion Meeting, Monterey, Calif., 11-13 Mar. 1980.

A survey of the reduced gravity fluid management technology program is presented. Information on reduced gravity fluid behavior, techniques for thermal control of cryogenic tankage, and design for fluid management systems are discussed. The development of Spacelab experiments, propellant management systems for orbit transfer vehicles, and computer techniques for simulating reduced gravity fluid dynamic processes is reported.

PAT-APPL-6-118 008 PC **A02**/MF **A01**
Department of the Air Force Washington DC
High Energy Solid Propellant Composition.
Patent Application,
A. E. Oberth. Filed 4 Feb 80, 12p AD-D007 126/6
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

In accordance with this invention, it has been found that the addition of certain perchlorate additives to poly(ethyleneoxide) diol containing high energy propellants provides the propellants with superior mechanical properties. The particular perchlorate additives found to overcome the mechanical behavior problem of prior art propellants are selected from the group consisting of lithium perchlorate (LiClO4) and magnesium perchlorate (Mg(ClO4)2). Accordingly, the primary object of this invention is to provide an additive material capable of providing PEG containing propellants with superior mechanical properties. Another object of this invention is to provide a mechanical behavior additive particularly adapated for use with high energy solid propellants.

22. SPACE TECHNOLOGY

22A. Astronautics

N79-78912/9 PC **A10**/MF **A01**
National Aeronautics and Space Administration, Washington, DC.
NASA 5-Year Planning: Fiscal Years 1980 through 1984.
31 Jan 79, 218p NASA-TM-80486

This report presents a 5-year program for NASA's aeronautics and space research and development for FY 1980 through 1984. Topics discussed include the following: Space Transportation Systems Program; Space and Terrestrial Applications Program; Aeronautics Program; Space Technology Program; Energy Systems Program; Space Science Program, Space Tracking and Data Systems Program; Construction of Facilities Program; Abbreviations and Acronyms.

N80-20230/2 PC **A04**/MF **A01**
REMTECH, Inc., Huntsville, AL.
Wake Flowfields for Jovian Probe.
Final Report.
C. D. Engel, and L. M. Hair. Mar 80, 62p NASA-CR-159235
Contract NAS1-15819

The wake flow field developed by the Galileo probe as it enters the Jovian atmosphere was modeled. The wake produced by the probe is highly energetic, yielding both convective and radiative heat inputs to the base of the probe. A component mathematical model for the inviscid near and far wake, the viscous near and far wake, and near wake recirculation zone was developed. Equilibrium thermodynamics were used for both the ablation and atmospheric species. Flow fields for three entry conditions were calculated. The near viscous wave was found to exhibit a variable axial pressure distribution with the neck pressure approximately three times the base pressure. Peak wake flow field temperatures were found to be in proportion to forebody post shock temperatures.

N80-21017/2 PC **A02**/MF **A01**
National Aeronautics and Space Administration, Washington, DC.
Fifth Working Conference (Space Biology) at the 21ST Plenary Session of Cospar.
S. S. Yurov. Mar 80, 4p NASA-TM-76107
Contract NASW-3199
Transl. Into English from Radiobiologiya (USSR), V. 18, No. 4, May 1979 p 786. Transl. By Kanner (Leo) Associates, Redwood City, Calif. Conf. Held at Innsbruck, 28 May - 10 Jun. 1978.

Space radiobiology is discussed with emphasis on the biological effects of heavy charged particles. Findings of spaceborne experiments on fungi, eggs, and seeds are presented.

22B. Spacecraft

AD-A082 960/6 PC **A04**/MF **A01**
Advisory Group for Aerospace Research and Development Neuilly-sur-Seine (France)
AGARD Highlights.
Mar 80, 64p Rept no. AGARD HIGHLIGHTS-80/1

Contents: The Role of Italy in Space Cooperation; Philosophy of Aeronautical Development Programmes for Italian Defence Modernization; Spacelab - A Reality of Today Projected into the Future; Summary of 1980 Meeting Themes.

AD-A083 001/8 PC **A13**/MF **A01**
Defense Technical Information Center Alexandria VA
Space Stations.
Report bibliography Jan 64-Nov 79.
Apr 80, 286p Rept no. DTIC/BIB/80-02
Supersedes Rept. no. DDC-TAS-75-10, AD-A010 500 and DDC-TAS-70-20-1, AD-703 500.

This bibliography contains unclassified and unlimited citations on Space Stations. These citations provide information emphasizing aerodynamic characteristics, checkout procedures, control systems, telemeter systems, electrical power systems, safety, navigation, space maintenance, space propulsion, and extravehicular activity. It also includes pertinent information on space shuttles and their operational characteristics. Four computer generated indexes are provided. (Author)

AD-A083 023/2 PC **A02**/MF **A01**
Wentworth Inst Boston MA
Payload Instrumentation for Probing Rockets.
Final rept. Apr 76-Mar 79,
R. W. Ebacher. Dec 79, 17p AFGL-TR-80-0027
Contract F19628-76-C-0211

Personnel, facilities, services and materials were provided for the design, development, fabrication, assembly, installation and testing of electro-mechanical instrumentation comprising the payloads utilized in aerospace vehicles as a part of the upper atmosphere and astronomical research program being conducted by the U.S. Air Force. Special devices such as a field programmable digital timer and low cost vibration recorder suitable for general use in sounding rocketborne sensing payloads were developed. Also developed was a control system to focus a cryogenically cooled infrared sensing instrument on a particular star. This contract also entailed the design, fabrication, assembly and testing of instruments for the remote operation and monitoring of the rocketborne apparatus from a blockhouse along with recovery and retesting of certain instruments. Provision was made for the preparation and reproduction of all necessary mechanical detail and assembly drawings and circuitry schematics, as well as for participation in the pre-flight, flight and post-flight field operations associated with the assembly, preparation and launching of the probing vehicles at the various launch sites selected by the Air Force Geophysics Laboratory for the conducting of rocket-borne experiments.

N80-20302/9 PC **A03**/MF **A01**
National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
Structural Tests on a Tile/Strain Isolation Pad Thermal Protection System.
J. G. Williams. Mar 80, 46p NASA-TM-80226

The aluminum skin of the space shuttle is covered by a thermal protection system (TPS) consisting of a low density ceramic tile bonded to a matted-felt material called strain insulation pad (SIP). The structural characteristics of the TPS were studied experimentally under selected extreme load conditions. Three basic types of loads were imposed: tension, eccentrically applied tension, and combined in-plane force and transverse pressure. For some tests, transverse pressure was applied rapidly to simulate a transient shock wave passing over the tile. The failure mode for all specimens involved separation of the tile from the SIP at the silicone rubber bond interface. An eccentrically applied tension load caused the tile to separate from the SIP at loads lower than experienced at failure for pure tension loading. Moderate in-plane as well as shock loading did not cause a measurable reduction in the TPS ultimate failure strength. A strong coupling, however, was exhibited between in-plane and transverse loads and displacements.

N80-20620/4 PC **A02**/MF **A01**
National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
Nonlinear Static Tps Analysis.
J. M. Housner, and R. Garcia. Mar 80, 20p NASA-TM-81785

A nonlinear analysis which includes the effect of mismatch and filler bar was developed to predict the strain isolator pad reuseable surface insulation through-the-thickness interface stresses. Parametric studies were conducted for simulated shock loading on square tiles. Expected loads on an actual tile were also studied. The results indicate that when no mismatch is present, linear solutions tend to give nonconservative maximum stresses relative to the nonlinear solutions. When mismatch is present, the linear maximum stresses are only conservative at low load levels and highly nonconservative at high load levels. Although the presence of filler bar reduces maximum tensile stresses in some cases, it does not appear that the nominal dimension filler bar can reduce the nonlinear stress to a level at which the linear solution becomes conservative relative to the nonlinear solution. Moreover, on an outboard trailing edge elevon tile at descent with +20 deg flap, the linear analysis is 49% nonconservative relative to the nonlinear analysis with filler bar.

PAT-APPL-6-126 272 PC **A02**/MF **A01**
Department of the Air Force Washington DC
Survivable Satellite Bus Structural Frame.
Patent Application,
Charles J. Farnham. Filed 3 Mar 80, 10p AD-D007 131/6
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A three-sided prism shaped structure including upper and lower graphite/epoxy honeycomb sandwich decks spaced by rectangular graphite/epoxy longerons and braces, all of which are attached by using machined aluminum fittings. A graphite/epoxy sandwich panel and cone assembly is bonded to one side of the structure for mounting a space sextant therein. Aluminum equipment panels are attached to the other two sides. The bus structure is manufactured in accordance with available procedures for fabricating graphite/epoxy composite material which is the primary structural material. (Author)

22C. Spacecraft Trajectories and Reentry

AD-A082 827/7 PC **A04**/MF **A01**
Naval Surface Weapons Center Dahlgren Lab VA
Data Generator for a Satellite-Borne Three-Axis Accelerometer.
Final rept.,
Carol G. Branch. Mar 80, 65p Rept no. NSWC/DL/TR-3849

Atmospheric drag has a significant effect on low-altitude trajectories. To measure this force, an accelerometer will be tested which senses this nonconservative acceleration. The information obtained will then be used to improve the orbit and obtain a more accurate gravity field model. When the raw data is first received, all known systematic effects will be removed. These include gravity gradient and pitch-rate induced accelerations. However, the preprocessed data will still contain anomalies of which there is little or no a priori knowledge. Satellite attitude thruster-induced vibrations are a major source of unmodeled noise. As for the instrument itself, each axis of the accelerometer adds an undetermined bias to the output accelerations. In addition, the conversion of the digital output to engineering units introduces a scale factor error. Other effects may take the form of additive correlated noise and white noise. The first instrument to be flown is the miniature electrostatic accelerometer (MESA). The MESA senses accelerations along the vehicle pitch, roll, and yaw axes. Relying on the accuracy of the vehicle's attitude control system, these axes are assumed to be along the R,R X V, and -R vectors, respectively. Hence, any attitude errors will be reflected in the measurements. The MESA also introduces undetermined scale factor errors and biases. Consequently, a computer program was designed which applies a filter to the processed accelerations. This filter should statistically remove most of the unmodeled corruptions. The filtered data is then input toa special version of the Celest orbit determination program.

AD-A082 888/9 PC **A03**/MF **A01**
Johns Hopkins Univ Laurel MD Applied Physics Lab
Drag Estimation and Satellite Orbit Determination.
Technical memo.,
A. Eisner. Mar 80, 47p Rept no. JHU/APL/TG-1327
Contract N00024-78-C-5384

Like the weather, upper atmospheric density often behaves upredictably. Even the best models of the upper atmosphere cannot consistently predict atmospheric density for Transit System satellites (1000 km) to the desired high precision. A comprehensive evaluation is presented of the drag estimation concept as a tool in routinely determining the orbit of the Transit System; the benefits to the Transit System are also examined. The resulting data (fitted along-track bias force) can be used subsequently to study upper atmospheric density variations at Transit satellite altitudes that will lead ultimately to improved upper atmospheric density models. Drag estimation in satellite orbit determination yields higher precision-tracked (determined) ephemerides and significantly improves the prediction (extrapolated satellite position) accuracy of the Transit System. (Author)

N80-20289/8 PC **A02**/MF **A01**
Analytical and Computational Mathematics, Inc., Houston, TX.
Coding, Testing and Documentation of Processors for the Flight Design System.
Final Report.
22 Feb 80, 24p NASA-CR-160552, ACM-TR-120
Contract NAS9-15787

The general functional design and implementation of processors for a space flight design system are briefly described. Discussions of a basetime initialization processor; conic, analytical, and precision coasting flight processors; and an orbit lifetime processor are included. The functions of several utility routines are also discussed.

22D. Spacecraft Launch Vehicles and Ground Support

AD-A083 021/6 MF **A01**
Boston Coll Chestnut Hill MA
Characterization of Titan III-D Acoustic Pressure Spectra by Least-Squares Fit to Theoretical Model.
Interim rept.,
Eugene B. Hartnett, and Eric Carleen. Jan 80, 59p SCIENTIFIC-2, AFGL-TR-80-0004
Contract F19628-78-C-0008
Availability: Microfiche copies only.

A theoretical model for the acoustic spectra of undeflected rocket plumes is fitted to computed spectra of a Titan III-D at varying times after ignition, by a least-squares method. Tests for the goodness of the fit are made.

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